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ABSTRACT

This curriculum guide is an adaptation for students who need to proceed more slowly with new concepts and who also require additional reinforcement. The materials have been designed to assist the teacher in developing plans to be utilized in a variety of classroom settings. The guide can be used to develop both individual and group lessons. In addition to pre-assessment exercises and an evaluation form, units included are: (1) formulas; (2) algebra; (3) the metric system; (4) geometry; (5) money management; and (6) probability and statistics. Each lesson includes the aim, performance objectives, essential vocabulary, specific teaching suggestions, applications, and a summary. (PK)

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FUNDAMENTALS OF MATHEMATICS

PART I EXTENDED — TIME — FRAME

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pyramid
solid figures
Indirect measurement
$2X + 7 = 15$
Product of the extremes
find the volume of a rectangular prism. Distinguish between prisms and cylinders.

$A = lw$
Interest rate $I = Prt$
Meaning of ratio and scale
Read the scale on a pictograph
Calculate the sales tax
7% effective annual yield
$V = lwh$
circle graph

EXPERIMENTAL EDITION

SE 048 834

NEW YORK CITY BOARD OF EDUCATION
Division of Curriculum and Instruction
Division of High Schools
Division of Special Education

FUNDAMENTALS OF MATHEMATICS

PART I EXTENDED — TIME — FRAME

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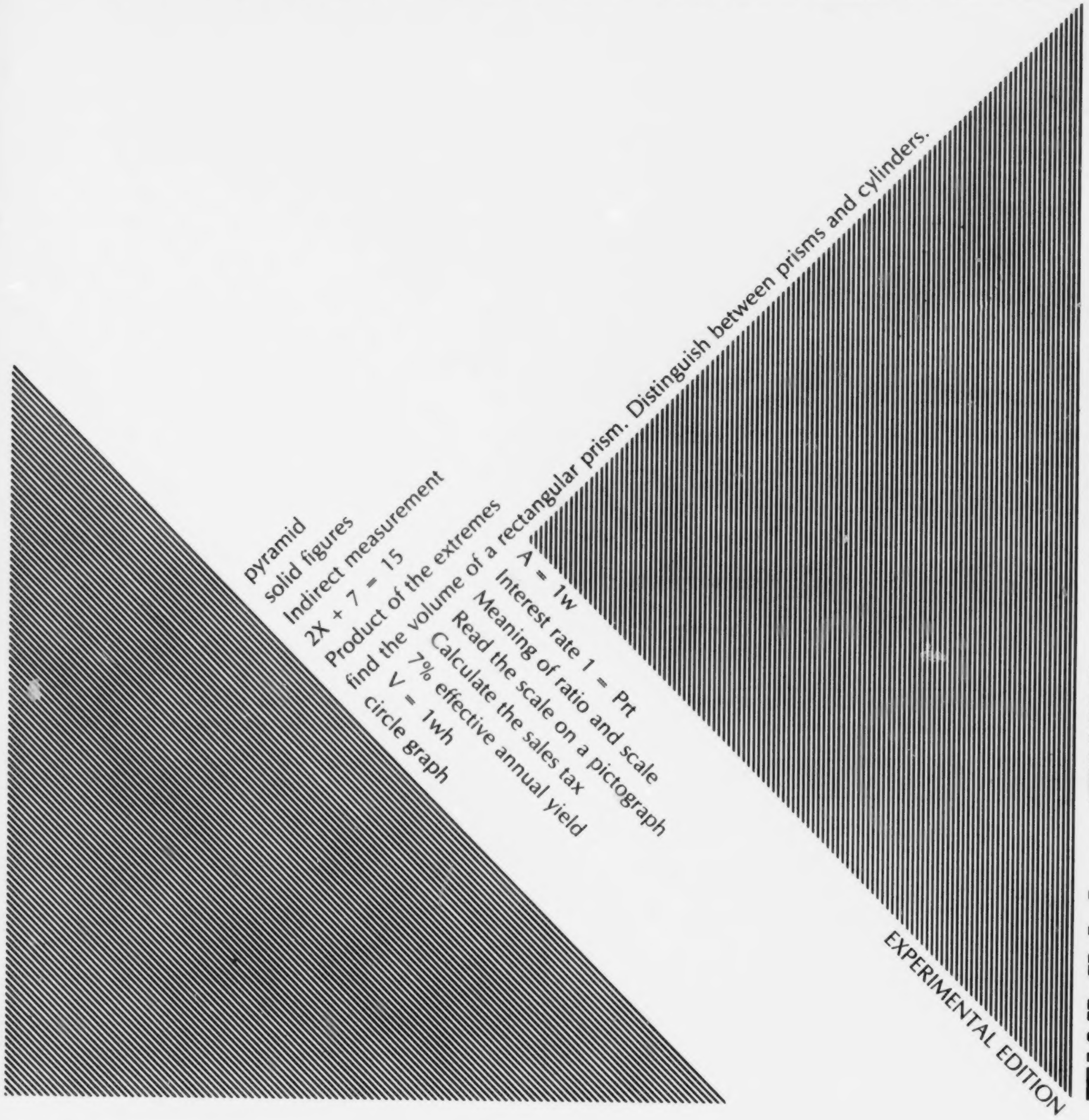
FUNDAMENTALS OF MATHEMATICS

PART I EXTENDED — TIME — FRAME



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NEW YORK CITY BOARD OF EDUCATION
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Foreword

This curriculum guide, Fundamentals of Mathematics I: Extended Time Frame, is an adaptation for students who need to proceed more slowly with new concepts and who also require additional reinforcement. The guide has been developed as part of a joint project of the Division of High Schools, Division of Special Education, and the Division of Curriculum and Instruction.

The materials have been designed to assist the teacher in developing plans to be utilized in a variety of classroom settings. This guide can be used to develop both individual and group lessons.

It will be up to the individual schools to determine whether the whole curriculum--Fundamentals of Mathematics, Part I and Part II--should be taught within a two, three, or four-year frame. This decision, of course, will be dependent on the individual functioning levels of the students. We have also attempted to provide the special education teacher with lessons that are useful in the self-contained mathematics class.

The lessons used in this guide are based on those that were developed for the New York City Board of Education Fundamentals of Mathematics, Part I curriculum guide. This extended time frame guide is designed to be used in close conjunction with Fundamentals of Mathematics, Part I. Each lesson contains the following elements:

1. Aim
2. Performance objectives
3. Essential vocabulary
4. Specific teaching suggestions
5. Applications
6. Summary

Although the mathematical skills and concepts are arranged in a sequential order, allowing for the spiraling of skills among units and between semesters, it is suggested that the teacher use flexibility in planning lessons to meet the individual needs of the students. The curriculum guide has been developed in such a manner as to allow for expanded time frames within which the specific mathematics skills and concepts may be taught. The adaptation of the curriculum also allows for a change of emphasis and the deletion of certain portions that may be taught at a later date.

Since the passing of the Regents Competency Test is one of the requirements needed to receive a high school diploma in New York State, a major goal of this guide is to aid students in developing the skills necessary to pass the New York State Regents Competency Test in Mathematics. However, for the graduating class of 1988 the Regents Action Plan calls for one additional year of mathematics after passing the Regents Competency Test.

Teachers and supervisors using this curriculum guide are urged to fill out the questionnaire at the back of this guide and return it to the Office of Curriculum Development and Support by the date indicated.

Charlotte Frank

Charlotte Frank
Executive Director
Division of Curriculum and Instruction

Acknowledgements

Fundamentals of Mathematics I: Extended Time Frame, a curriculum adaptation for nonmainstreamed High School Special Education diploma bound students is a collaborative effort of the Division of High Schools, Sylvia Balatt, Executive Director; the Division of Special Education, Edward M. Sermier, Chief Administrator; and the Division of Curriculum and Instruction, Charlotte Frank, Executive Director.

The Division of Curriculum and Instruction collaborated on this project through Morris Freedman, Director of the Office of Curriculum Development. The principal writers for the first three units were John Hartnett, a Special Education Supervisor and Bernice Wolodarsky, a Special Education Teacher. Neal Ehrenberg of the Division of Curriculum and Instruction provided supervision of the design of the project and development of the first three units. Rochelle Ehrenberg reviewed and revised the last three units under the direction of Gerald Elgarten, Director of Mathematics (Interim Acting).

A working draft of Units I through III was prepared by the Division of Special Education Curriculum Development Unit. Sallejane Seif, Division of High Schools, Special Education Assistant, was the overall project coordinator.

A special thank you to Dr. Charles Schonhaut, BASIS High School Superintendent, William Jesinky, Special Education Principal, and Michael Grandwetter, High School Special Education Lead Supervisor for providing the impetus for the project.

The manuscript was prepared for publication by the Editorial and Production Unit, Alaire Mitchell, Unit Head. Editing by Judy Goldberg. Production and Coordination by Sarah Corbin and Maureen Maguire. Word Processing by Pat DePalo. Layout by Conrad Nunnally. Cover design by Tom Wright.

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Suggestions for the Use of This Bulletin

The topics and individual themes covered in this curriculum guide are not meant to be taught within one class period. It is suggested that the teacher use each of the themes as a master plan that should be divided into smaller teaching modules according to the specific functioning levels of individual students in a class. (It is possible that these topics be taught in a slightly different sequential order. This will be noted where appropriate). The controlling factor should be that all of the performance objectives of the individual themes be met.

The teacher should be aware that existing testing modifications and teaching strategies allow for the use of calculators and visual aids in the classroom. Discretion must be used in determining which student should be allowed to use a calculator in the classroom. This determination could be based on the pre-assessment activity and testing modifications listed on the student's I.E.P. Where the use of the calculator is indicated, the teacher must not take for granted that the student can operate a calculator without instruction. Provisions should be made for group and individual instruction in the correct operation and use of a calculator. In many cases we have included calculator applications as part of individual themes. The teacher should incorporate these applications in the individual lesson plans.

Educators should be aware that many of their students have specific learning disabilities, such as long-term and short-term memory retention difficulties. It is therefore suggested that each lesson should provide for the development and use of visual, auditory and tactile teaching aids. Again, suggestions for such aids are included in many topics. Successful attainment of the performance objectives is most probable when students are taught by utilizing their individual strengths. To assist the teacher in assessing the student's success in attaining the performance objectives, we have included, at the end of each theme, suggested test items. It is left to the discretion of the teacher as to whether there is a need for a unit test at the completion of each unit. No mid-term or final exam has been included in order to allow flexibility to each school in structuring the time frame within which this curriculum is to be taught. In light of this, it is suggested that teachers continually give their own quizzes to check the student's progress.

The adapted curriculum will utilize the same format as that employed in the FM I curriculum guide. It is necessary for the teacher to use both the FM I guide and this adapted guide in tandem. Following, are some explanations and clarifications of methods to be followed when using this guide:

1. We have changed the word "aim" to theme. This has been done to alert the teacher that these topics will not be taught in one day, but rather over an extended period of time.

2. The theme should be used as a guide for the teacher in formulating the central idea of the lesson plans to be developed for the topic.

3. The vocabulary section for each topic will indicate new vocabulary and review terms to be added and/or deleted from each topic.

4. If there is an adapted challenge problem, it should be used in place of, or in addition to, the FM 1 Guide, challenge problem. The teacher should develop and display visual aid charts in the classroom to illustrate vocabulary terms. It is also suggested that students maintain a vocabulary section in their notebooks, to be used as a glosssary for the course work.

5. The adapted performance objectives replace the FM 1 guide performance objectives. In some instances they remain the same, in many others they will either be changed or deleted. They are not to be placed on the chalkboard for the students. They are the observable, and measurable goals for each student to attain.

6. In many instances, it was necessary to change the development of the lesson in order to fit the sequential listing of the adapted performance objectives. The adapted development will inform the teacher when to use either the FM 1 guide materials, or the adapted curriculum materials. The development for each theme should be used by the teacher as a guide indicating one possible, logical and orderly flow in the teaching of the theme.

7. We have included numerous applications in this guide. These are designed to help the teacher in adapting materials to fit the individual needs of the students. The teacher should use the adapted applications as a model to develop numerous applications to be used in the classroom. The adapted applications included in this guide will probably not be sufficient to permit the students to attain the performance objectives. We will provide the answers to the applications, where noted, within parentheses.

8. It is suggested that the teacher include a homework assignment at the end of each lesson, for every theme, and to reinforce the lesson's work. This can also be used as a follow-up to assist in checking the individual student's success in attaining the performance objectives. The teacher may choose to use the application as a model from which to develop the lesson's homework.

PRE-ASSESSMENT EXERCISE:

The following tests in the four basic operations may be used as an assessment tool for the classroom teacher. These exercises can be incorporated prior to instruction in each lesson.

Test 1 - Addition
Test 2 - Subtraction
Test 3 - Multiplication
Test 4 - Division

These tests should be used to assess the student's strengths and weaknesses. Within each test the different concepts of each operation are tested. The teacher should determine where the frequency of error occurs and should provide for individual remediation of these specific weaknesses.

Name:______________________________________

ADDITION ASSESSMENT TEST
(WHOLE NUMBERS)

1) Add:

$$\begin{array}{r} 4 \\ +7 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ +5 \\ \hline \end{array} \qquad \begin{array}{r} 6 \\ +7 \\ \hline \end{array} \qquad \begin{array}{r} 0 \\ +8 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ +7 \\ \hline \end{array}$$

2) $$\begin{array}{r} 64 \\ +33 \\ \hline \end{array}$$

3) $$\begin{array}{r} 95 \\ +42 \\ \hline \end{array}$$

4) $$\begin{array}{r} 78 \\ +51 \\ \hline \end{array}$$

5) $$\begin{array}{r} 63 \\ +75 \\ \hline \end{array}$$

6) $$\begin{array}{r} 74 \\ +59 \\ \hline \end{array}$$

7) $$\begin{array}{r} 82 \\ +78 \\ \hline \end{array}$$

8) $$\begin{array}{r} 345 \\ +129 \\ \hline \end{array}$$

9) $$\begin{array}{r} 728 \\ +180 \\ \hline \end{array}$$

10) $$\begin{array}{r} 302 \\ 49 \\ +\ 62 \\ \hline \end{array}$$

11) $$\begin{array}{r} 4783 \\ 264 \\ +197 \\ \hline \end{array}$$

12) Find the sum

$3,427 + 400 + 28 + 6$

Name:________________________________

SUBTRACTION ASSESSMENT TEST
(WHOLE NUMBERS)

1) Subtract:

$$\begin{array}{r}8\\ \underline{-3}\end{array}\qquad\begin{array}{r}10\\ \underline{-5}\end{array}\qquad\begin{array}{r}5\\ \underline{-2}\end{array}\qquad\begin{array}{r}6\\ \underline{-4}\end{array}\qquad\begin{array}{r}9\\ \underline{-3}\end{array}$$

2) $\begin{array}{r}32\\ \underline{-21}\end{array}$

3) $\begin{array}{r}87\\ \underline{-45}\end{array}$

4) $\begin{array}{r}81\\ \underline{-54}\end{array}$

5) $\begin{array}{r}63\\ \underline{-27}\end{array}$

6) $\begin{array}{r}289\\ \underline{-44}\end{array}$

7) $\begin{array}{r}126\\ \underline{-89}\end{array}$

8) $\begin{array}{r}782\\ \underline{-145}\end{array}$

9) $\begin{array}{r}607\\ \underline{-132}\end{array}$

10) $\begin{array}{r}1003\\ \underline{-\ 294}\end{array}$

11) Find the difference
817-29

Name:____________________________________

MULTIPLICATION ASSESSMENT TEST
(WHOLE NUMBERS)

1) Multiply:

8	6	7	0	9
x3	x4	x3	x7	x6

2) 23
x 3

3) 628
x 6

4) 27
x53

5) 365
x 58

6) 478
x175

7) 40
x37

8) 107
x 62

9) 436
x 50

10) 1347
x 82

Name:____

DIVISION ASSESSMENT TEST
(WHOLE NUMBERS)

1) Divide:

$42 \div 7 =$ $45 \div 5 =$ $18 \div 6 =$ $54 \div 9 =$

2) $3/\overline{21}$ $4/\overline{32}$ $9/\overline{63}$ $8/\overline{72}$

3) $3/\overline{36}$ 4) $8/\overline{576}$

5) $2/\overline{63}$ 6) $3/\overline{643}$

7) $21/\overline{882}$ 8) $57/\overline{4617}$

9) $50/\overline{3500}$ 10) $5/\overline{1005}$

UNIT I — FORMULAS

INTRODUCTION

The main objective in Unit I is to reinforce the four basic operations. This is accomplished in conjunction with the introduction of new mathematical concepts. The reinforcement is necessary because these operations will be used repeatedly throughout the FM 1 course. It is for this reason that the time frame established for each topic must be flexible and dictated by the needs of the individual students. The major thrust of Unit 1 will be the practical application of the four basic mathematical operations.

Topic One

THEME: To learn how to use number signs to represent operations and symbols to represent numbers.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- identify the operation associated with the words: sum, difference, product, quotient.
- change a number word, or number phrase, into number symbols.
- change an operation word, or number phrase, into an operation sign.
- state the meaning of a binary expression.
- state the meaning of variable, when used in a mathematical concept.
- use a variable in a binary expression.
- represent a product of two or more numbers using the following symbols: x, ( ), ·, and no sign at all.
- change a number and operation phrase containing only one binary operation into the appropriate number symbol and operational sign.

VOCABULARY ADAPTATIONS:

Additional terms:	signs, symbols, basic operation, sum, difference, product, quotient
Terms omitted:	evaluate

ADAPTATIONS FOR LESSON 1, pages 1-3

ADAPTED APPLICATIONS: Activities suggested prior to Application A.

1. Development of visual aid chart for vocabulary relating to the four basic operations.

ADDITION +

Sum
Total
In all
All together
Plus
Increased by
Add
More than

SUBTRACTION -

Difference between
Minus
Less than
Diminished by
Decreased by
Take away
Subtract from

MULTIPLICATION X, ·, ( )

Times
Product of
Twice, Triple
Multiplied by

DIVISION ÷

Divided by
Quotient of

2. Number Word Chart

Express number word as numerical symbol:

one - 1
two - 2
three - 3
four - 4
five - 5
six - 6
seven - 7
eight - 8
nine - 9
ten - 10
eleven - 11
twelve - 12
thirteen - 13
fourteen - 14
fifteen - 15
sixteen - 16
seventeen - 17
eighteen - 18
nineteen - 19
twenty - 20
thirty - 30
forty - 40
fifty - 50
sixty - 60
seventy - 70
eighty - 80
ninety - 90
one hundred - 100
one thousand - 1000

CALCULATOR APPLICATION: To be used after A.3. and before B.1., pg.2.

- Instruction in the proper use of a calculator

  A) After the completion of application A.3., instruct the students in the use of a calculator by keying in the appropriate numerical symbol and operational sign.

  B) No equal sign (=) is indicated for this operation, but rather clearing the calculator after each phrase for use in the next expression. Students should not obtain a result at this point.

  C) Further instruction in the use of a calculator will be incorporated in future lessons.

ADAPTED APPLICATIONS: for use prior to FM 1 application B, page 2.

1. Use the box symbol rather than letter to express a number phrase:

Samples:

a) the sum of five and a number
   5 + □
b) a number decreased by eight
   □ - 8
c) twelve divided by a number
   12 - □
d) the product of three and a number
   3 X □
e) a number increased by ten
   □ + 10
f) triple a number
   3 X □
g) nine more than a number
   □ + 9
h) six times a number
   6 X □
i) three less than a number
   □ - 3
j) eleven decreased by a number
   11 - □
k) from thirty seven subtract a number
   37 - □
l) from a number subtract fifteen
   □ - 15
m) divide a number by seven $\frac{\square}{7}$

NOTE: Application B2, page 2-3 may be deemphasized but should not be omitted completely.

SUMMARY: To be added to the summary items on FM 1, page 3.

Add word problems using the 4 basic operations and have students set up a number phrase.

Addition:

Bob walked five miles on Monday and seven miles on Tuesday. How many miles did he walk in all. (5 + 7)

Subtraction:

John had seven dollars and James had twelve dollars. How much less did John have than James? (12 - 7)

Multiplication:

Robert works at a super market. He earns three dollars an hour. If he works five hours on Saturday, how many dollars will be earned? (3 X 5)

Division:

Tom and Joe mowed their neighbors' lawns. They made eighteen dollars one day. If they divided the money evenly how much did each boy get? (18 ÷ 2)

NOTE: Omit cliff hanger

SUGGESTED TEST ITEMS FOR TOPIC 1

NAME____________________________

1. On the line to the right of each phrase write the symbol of operation. (+,-,x,÷) that is indicated by the phrase. Do NOT compute.

   a. the difference between x and y a.______________________

   b. pq b.______________________

   c. the quotient of 625 and 15 c.______________________

   d. 397 increased by Q d.______________________

   e. $\frac{D}{t}$ e.______________________

   f. the product of 35 and 710 f.______________________

   g. five less than 25 g.______________________

2. Rewrite each English phrase in numerals and symbols.

   a. 27 divided by the number 9

   b. 16 more than 5.

   c. the product of 7 and 8

   d. the sum of 4, 3, and 2

   e. from 34 subtract 9

3. Write a number phrase for the following word problems showing the correct numerical symbol and operational sign;

   a. A can of soup costs thirty seven cents. How much do six cans of soup cost?

   b. Tanya had thirty pencils. She gave four of them away. How many pencils did she have left?

   c. Dr. J scored twenty-one points against the Knicks, and eighteen points against the Lakers. How many points did he score in those two games?

   d. Mrs. Cruz had eighty-five dollars in the bank. She took out fifty dollars. How much money did she have left in the bank?

   e. Pedro earned seventy-five dollars for working five days. If he earned the same amount of money each day, how much money did he earn in one day?

Topic Two

THEME: To substitute numerical symbols for variables in algebraic expressions with one or more variables.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- change a word phrase containing one or more variables into a number phrase using box symbols.
- change a number phrase containing one or more variables into an algebraic phrase.
- replace variables in an algebraic expression with their designated numerical values.
- change the original horizontal numerical expression into that of a vertical numerical expression, for ease of computing the answer.
- solve the numerical problem using the appropriate operations.

VOCABULARY ADAPTATIONS:

Additional terms: Algebraic expression, horizontal, vertical.

ADAPTATIONS FOR LESSON 2, pages 4-6

ADAPTED APPLICATIONS: Do these applications prior to Application A. pg. 5

1. Use these applications prior to Application A. pg. 5

   SAMPLES:

   a) What is the sum of 47 and a number, if the number is 23?
   $47 + \square$; $47 + (23)$
   b) What is the total of 571 and a number, if the number is 168?
   $571 + \square$; $571 + (168)$
   c) What is the difference between 52 and a number, if the number is 14?
   $52 - \square$; $52 - (14)$
   d) What is the value of 86 decreased by a number, if the number is 33?
   $86 - \square$; $86 - (33)$
   e) What is the product of 71 and a number, if the number is 6?
   $71 \times \square$; $71 \times (6)$
   f) What is the quotient of 28 and a number, if the number is 4?
   $28 - \square$; $28 - (4)$

2. Using examples a through f, set up algebraic expressions using any letter symbols in place of box symbols.

3. Using examples a through f, replace the letter symbol in the algebraic expression with the appropriate numerical symbol to develop a mathematical number problem.

IMPORTANT: The teacher must stress the fact that box and letter symbols, in and of themselves, have no value, only number symbols have values. The box and letter symbols only have value when they are replaced by a number symbol. This is called substitution.

4. Using the mathematical number problems developed from examples a through f, the students should now place the numerical expression into computational form (change from the horizontal into the vertical format).

5. Have the students solve the numerical problems for examples a through f.

CALCULATOR APPLICATION:

a) Review method of entering appropriate number symbols and operational signs.

b) Have students find the answers for examples a through f, without the use of the calculator.

c) Introduce the use of equal sign (=) on the calculator. Have the students enter the entire math problem in the calculator and hit the equal sign (=) to obtain the answer. This method may be used to check their original self-calculated answers.

d) Always have the students attempt to arrive at the correct answer before using the calculator to check their original self-calculated answers.

7. Proceed to Application A, page 5. FM 1.

8. Prior to Application B.1. give numerical problems. Examples:
   a) the product of three and four (3 x 4)
   b) twice the product of five and six
      1) 2 · 5 · 6
      2) (2) (5) (6)
      3) 2x5x6
   c) the sum of six and two decreased by four (6+2-4)
   d) the number whose factors are seven, eight and three.
      1) 7 · 8 · 3
      2) (7) (8) (3)
      3) 7 x 8 x 3

IMPORTANT: Place more emphasis on Application 8, than on the regular application 8.1 pg 5. This is necessary to stress the concrete math usage over the abstract concept of algebraic expressions.

SUMMARY:

Prior to summary #1, have students write expressions using box and number symbols, then proceed to use the algebraic form as in summary #1.

SUGGESTED TEST ITEMS FOR TOPIC 2

NAME ________________________________

1) Substitute the given value of the variable, and compute the answer:

   a) $6 + X$; $X = 5$

   b) $N - 8$; $N = 43$

   c) $\frac{2336}{y}$; $y = 6$

   d) $12p$; $p = 0$

   e) $X + 321$; $X = 164$

2) Write each word phrase as a number phrase (DO NOT COMPUTE):

   a) the product of five and three

   b) twice the product of four and two

   c) the sum of seven and three, decreased by five

   d) the number whose factors are eight, two, and three

   e) the difference between thirteen and seven

3) Name the operation or operations shown in each problem;

   a) lm
   b) $r + t$
   c) $\frac{f}{a}$
   d) abc
   e) $2d \div 2e$

4)

f	M	R	b	a
4	3	7	0	12

Substitute the correct value of the variable using this chart, and compute the answer.

   a) fR
   b) $R + a + M - f$
   c) $M \cdot M \cdot M$
   D) $MRab$
   e) $\frac{a}{f}$

Topic Three

THEME: To learn how to use the correct order of operations to find the value of numerical and algebraic expressions.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- compute a horizontal expression containing additions and/or subtractions only.
- compute a horizontal expression containing multiplication and/or division only.
- compute a horizontal expression containing multiplication with addition and/or subtraction.
- compute a horizontal expression containing division with addition and/or subtraction.
- state the correct order in which operations are to be performed.
- compute algebraic expressions with variables that have stated values, using the correct order of operations.
- state that all numerical expressions may have only one correct value.

VOCABULARY ADAPTATIONS:

Review term: Horizontal

ADAPTATIONS FOR LESSON 3, pages 7-9

Challenge Problem: Prior to the Challenge Problem a, page 7, use:

"If you were given the following problem, what would you do first? Why?"
$55 - 12 + 3$

DEVELOPMENT:

Prior to beginning development #1, page 7:

A) Elicit the following responses for the Adapted Challenge Problem;

Possibility #1	Possibility #2
$\begin{array}{r}55\\-12\\\hline 43\end{array}$ then $\begin{array}{r}43\\+3\\\hline 46\end{array}$	$\begin{array}{r}12\\+3\\\hline 15\end{array}$ then $\begin{array}{r}55\\-15\\\hline 40\end{array}$

Elicit the fact that two different answers were found due to the order in which the math operations were performed. Since everyone must get the same correct answer from the problem, agreement must be reached on the order in which the operations are performed.

Inform the students that in problems where only addition and subtraction are involved the rule is:

- Perform all additions and subtractions in order from left to right.

B) Display the challenge problem for the students horizontally, as follows:

55 - 12 + 3 = ?

43 + 3 = 46

C) Do the adapted Applications #1 and #2.

D) Present the following problem and follow a procedure similar to the one used in A and B to elicit the rule where only multiplication and subtraction are involved.
"What would you do first in finding the value of: 12 ÷ 3 x 2? Why?"

Possibility #1	Possibility #2
12 ÷ 3 = 4 then	3 x 2 = 6
4 x 2 = 8	12 ÷ 6 = 2

State the rule: When only multiplication and division are involved in a number phrase PERFORM ALL MULTIPLICATIONS AND DIVISIONS IN ORDER FROM LEFT TO RIGHT.

E) Do Adapted Applications #3 and #4.

F) Follow the development #1 and #2, FM 1 pages 7-8. Prior to doing application A page 9 do applications #5 and #6.

G) The Items in application A, FM 1, pg. 9 may be used as summary material.

H) Complete development #4, and #5 FM 1 pg 8-9. Application B and this development may be deemphasized but should be included.

ADAPTED APPLICATIONS:

1. Compute the following numerical expressions;

A) 63 - 27 + 4 = (40)
B) 7 + 52 - 36 = (23)
C) 81 + 13 - 9 = (85)
D) 23 - 19 + 38 = (42)
E) 64 - 35 - 12 = (17)
F) 11 + 43 - 26 = (28)
G) 6 + 55 - 9 = (52)
H) 59 - 10 + 8 = (57)
I) 16 + 53 - 60 = (9)
J) 3 + 71 - 48 = (26)

2. CALCULATOR APPLICATION:

A) Have the students use their calculators to check their answers, reviewing the rule learned in Development A.

B) It is important to stress that in problems where only addition and/or subtraction operations are involved that the student should enter the problem exactly as it is written from left to right. This will reinforce the rule learned in Development A.

This order of entry will change, as does the order of operations, when multiplication and/or division are combined with addition and/or subtraction operations.

3. Compute the following numerical expressions;

A) $27 \div 9 \times 2 = (6)$
B) $3 \times 6 \div 3 = (6)$
C) $5 \times 4 \div 10 = (2)$
D) $45 \div 9 \times 5 = (25)$
E) $7 \times 1 \div 7 = (1)$
F) $6 \times 5 \div 3 = (10)$
G) $33 \div 11 \times 4 = (12)$
H) $28 \div 2 \times 5 = (70)$
I) $9 \times 4 \div 12 = (3)$
J) $\frac{8}{4} \times 7 = (14)$

4. CALCULATOR APPLICATION:

A) Have the students use their calculators to prove their answers, reviewing the rule learned in Development A.

B) It is important to stress that in problems where only multiplication and/or division are involved that the student should enter the problem exactly as it is written from left to right. This will reinforce the rule learned in Development A.

NOTE: Again, it is important to note that when addition and subtraction operations are combined with multiplication and division operations the order of entry will not always be strictly from left to right.

5. Compute the following numerical expressions;

A) $6 + 3 \times 7 = (27)$
B) $6 \times 5 - 4 = (26)$
C) $46 - 6 \times 7 = (4)$
D) $72 \div 9 - 1 = (7)$
E) $9 + \frac{9}{3} = (12)$
F) $15 + 6 \div 3 = (17)$
G) $10 + 10 \div 10 = (11)$
H) $8 + 6 \times 2 = (20)$
I) $16 - 9 \times 0 = (16)$
J) $42 \div 6 - 4 = (3)$

6. CALCULATOR APPLICATION:

A) Review with students the rules of the correct order of operations as learned in Development 1.

B) Have the students enter the information into their calculators in the correct order of operations. It is important to stress with the students the fact that if problems combining addition and/or subtraction with multiplication and/or division are entered into the calculator from left to right, the wrong answer will be displayed. This will help to reinforce the rules of the correct order of operations.

SUGGESTED TEST ITEMS FOR TOPIC 3

NAME ______________________________

1) Compute the following numerical expressions;

A) 25 - 12 + 3 =

B) 8 + 47 - 19 =

C) 65 + 14 - 13 =

D) 26 - 15 + 37 =

E) 54 - 25 - 10 =

F) 36 ÷ 6 x 3 =

G) 4 x 7 ÷ 4 =

H) 6 x 5 ÷ 10 =

I) 54 ÷ 9 x 5 =

J) $\frac{9}{3}$ x 8 =

2) Compute the following numerical expressions;

A) 7 + 3 x 8 =

B) 8 x 5 - 6 =

C) 47 - 3 x 4 =

D) 81 ÷ 9 - 2 =

E) 12 - $\frac{10}{5}$ =

3) Compute the following expressions for the stated value of the variable x;

A) $4x + 3; x = 5$

B) $120 - 8x; x = 7$

C) $\frac{6x}{2}; x = 8$

D) $14x + 9; x = 0$

E) $21x - 48; x = 6$

F) $\frac{11x}{6} + 4; x = 6$

G) $3x + 5 + 9x; x = 3$

H) $261 - 27x; x = 4$

I) $\frac{1264}{x}; x = 2$

J) $13x + x - 19; x = 9$

Topic Four

THEME: To learn how to use parentheses to group numbers.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- determine that the operations within the parentheses are to be performed first.
- compute numerical expressions with parentheses
- use the distributive property of multiplication over addition

VOCABULARY ADAPTATIONS:

Review term: horizontal numerical expression

ADAPTATIONS FOR LESSON 4, FM 1 pages 10-11

Challenge Problem: Prior to FM 1, pg 10 challenge problem use:
"If you were given the following numerical expression 15 - (8 + 3), what would you do first?"

DEVELOPMENT: Prior to development #1, FM 1, pg 10 add development A.

A) Elicit from students, 2 possible answers:

A	B
15 - (8 + 3)	15 - (8 + 3)
15 - 8 = 7	15 - 11 = 4
7 + 3 = 10	

Have students recall that only one result can be obtained for any questions. We want the result for this expression to be the answer found in b.

B) Establish rule -
All operations within the parentheses must be performed first. After performing operations within the parentheses, compute the value of the numerical expression following the rules for correct order of operaton.

C) Proceed to development #1 through #4, FM 1 pages 10, 11.

D) Prior to Development #5 FM 1, use the following to illustrate the concept of the "distributive property of multiplication over addition." Some problems can be solved in more than one way. Joseph, a sophomore and Thomas, a junior, tried to find the total number of students that were in both of their homerooms.

Joseph's Sophomore Homeroom					Tom's Junior Homeroom				
5	Soph	Soph	Soph		Jun	Jun	Jun	Jun	5
Sophs	Soph	Soph	Soph		Jun	Jun	Jun	Jun	Juniors
in	Soph	Soph	Soph		Jun	Jun	Jun	Jun	in
each	Soph	Soph	Soph		Jun	Jun	Jun	Jun	each
row	Soph	Soph	Soph		Jun	Jun	Jun	Jun	row
	3 rows of Sophs					4 rows of Juniors			

Joseph's solution	Thomas' solution
3 rows of Sophs x5 Sophs in each row 15	3 rows of Sophs +4 rows of Juniors 7
4 rows of Juniors x5 Juniors in each row 20	7 rows of students x5 students in each row 35
15 Sophomores +20 Juniors 35 students in both homerooms	

Joseph used this numerical expression to solve the problem;

(3 x 5) + (4 x 5)

Thomas used this numerical expression to solve the problem;

5 x (3 + 4)

This problem can be solved in both ways. The two different numerical expressions have the same value, or answer. Thus, it follows that:

(3 x 5) + (4 x 5) = 5 x (3 + 4)

This is an example of the "distributive property of multiplication over addition.

Explain to the students that in the expression 5 x (3 + 4), the number 5 distributes, or multiplies itself over both numbers within the parentheses, 3 and 4. It is for this reason that both numerical expressions have the same value.

(refer back to Applications)

E. Application A of FM 1 may be omitted.

F. Move application B to summary of topic and change as indicated.

ADAPTED APPLICATIONS:

Prior to application A, FM 1, perform the following indicated operations.

1) a) 9 + (18 + 14) = (41)
   b) 39 - (51 - 48) = (36)
   c) 66 - (23 + 15) = (28)
   d) (12 + 71) - 46 = (37)
   e) 54 + (9 + 27) = (90)
   f) (73 - 68) + 5 = (10)
   g) 62 + (35 - 4) = (93)
   h) (91 - 89) + 53 = (55)
   i) (15 + 8) + 16 = (39)
   j) 50 + (97 - 68) = (79)

2) Perform the indicated operation using the distributive property of multiplication over addition.

   a) 5 (4 + 7) = (55)
   b) 6 (3 + 8) = (66)
   c) (5 + 6) 3 = (33)
   d) 8 (3 + 7) = (80)
   e) (9 + 0) 10 = (90)

3) Which expression in Column A is equivalent, or the same, as an expression in Column B?

	Column A	Column B
______	1. 2 (4 + 5)	a. 19 (21) + 19 (19)
______	2. 5 (7 + 3)	b. 2 (4) + 2 (5)
______	3. (7 + 3) 9	c. 300
______	4. 12 (8 + 17)	d. 5 (10)
______	5. 19 (21 + 19)	e. (7) 9 + (3) 9

CALCULATOR APPLICATION:

Use the calculator as a checking device for this topic. Emphasize that students must obtain the results for operations inside parentheses before performing operations outside parentheses.

Example: 2 (4 + 5)
A. Punch in 4, plus sign, 5, multiplication sign, 2, then equal sign to get answer. or B. Punch in 4, plus sign, 5, = symbol. Obtain result, 9. Type multiplication sign (x), 2, then equal symbol again to get final result. 18.

SUGGESTED TEST ITEMS FOR TOPIC 4

NAME ______________________________

1. Compute the following numerical expressions:

   a) 8 + (17 + 13) =

   b) 49 - (31 - 28) =

   c) 57 - (14 + 19) =

   d) (16 + 81) - 37 =

   e) 42 + (6 + 25) =

2. Compute the following numerical expressions using the distributive property of multiplication over addition:

   a) 7 (3 + 8) =

   b) 4 (6 + 7) =

   c) (7 + 6) 2 =

   d) 8 (4 + 5) =

   e) (8 + 0) 11 =

3. Compute the following numerical expressions:

   a) 7 (8 - 5) =

   b) 7 - 8 - 5 =

   c) 45 ÷ 5 + 4 =

   d) 45 ÷ (5 + 4) =

4. Which expression in Column B is equivalent to an expression in Column A?

	Column A	Column B
______	1. 3 (4 + 6)	a. 18
______	2. 8 (5 + 2)	b. 16 (13) + 16 (5)
______	3. (6 + 7) 9	c. 3 (4) + 3 (6)
______	4. 10 (2 + 8)	d. 8 (7)
______	5. 16 (13 + 5)	e. 100
______	6. 2 (4 + 5)	f. (6) 9 + (7) 9

Topic Five

THEME: To learn about exponents and how to compute numerical expressions containing exponents.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define repeated multiplication.
- change a word phrase containing repeated multiplication to a number phrase.
- define exponent and base.
- compute numerical expressions containing exponents.
- compute the squares and cubes of numbers.
- compute numerical expressions containing two or more numbers written in exponential form.
- express repeated multiplication in exponential form.

VOCABULARY ADAPTATIONS:

Additional terms: repeated multiplication

ADAPTATIONS FOR LESSON 5, FM 1, pages 12-13

Challenge Problem:

NOTE: The word factor is not of prime importance in this lesson. It is the idea of repeated multiplication and concrete application of computational skills that should be stressed. "Factors" does not have to be omitted, but may also be used for enrichment. Therefore, the challenge problem has been reworded as follows:

- "Find the answer when four 3's are multiplied."

ADDITIONAL ADAPTED APPLICATIONS:

In order to reinforce development #6, FM 1 pg. 13, have the students find the value of the following numerical expressions. This application should follow application D, FM 1 page 13.

1) $4 \times 8^3 =$ (2,048)

2) $3 \times 5^4 =$ (1,875)

3) $2^3 \times 3^2 =$ (72)

4) $4 \times 10^2 =$ (400)

5) $5^2 + 7^2 =$ (74)

CALCULATOR APPLICATION:

1. Reinforce the correct use of the calculator:

    a) For use as a checking device, to check the student's own self-calculated answer.

    b) Accuracy in entering correct numbers and operational signs.

2. Reinforce the rules for correct order of operations.

3. Reinforce the rule of doing all work within parentheses, ( ), first.

4. The calculator may be used, in this lesson, to reinforce the concept of repeated multiplication, as written in exponential form. Example; 6 x 4^3 - should be entered as 6, multiplication sign, 4, mult-sign, 4, mult-sign, 4, equal sign, to obtain the correct value.

SUGGESTED TEST ITEMS FOR TOPIC 5

NAME ______________________________

1) Express each of the following as repeated multiplication: (Do not compute)

a) 2^4

b) 10^3

c) 1^7

2. Express each of the following using exponents: (Do not compute)

a) $6 \times 6 \times 6 \times 6 =$

b) $8 \times 8 \times 8 =$

c) $5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 =$

3. Name the base and the exponent in each expression

	BASE	EXPONENT
a) 5^3	________	________
b) 6^{12}	________	________
c) 1^7	________	________

4. Rewrite each expression as repeated multiplication and compute the answer;

	Expressed as repeated multiplication:	Answer:
a) 2^5	________________________________	______
b) 11^2	________________________________	______
c) 9^3	________________________________	______
d) 3^6	________________________________	______

5. Find the square and cube of each number:

	SQUARE	CUBE
a) 7	_____	_____
b) 4	_____	_____
c) 12	_____	_____

6. Compute the following numerical expressions:

a) 3×6^2

b) 4×5^3

c) $6^2 + 2^3$

Topic Six

THEME: To learn how to compute algebraic expressions with substitution for the variables.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- rewrite variables with exponents as repeated multiplication.
- substitute numerical values in algebraic expressions.
- compute algebraic expressions containing variables with exponents through the use of substitution.

VOCABULARY ADAPTATIONS:

Additional Review Terms: square, cube, repeated multiplication, algebraic expression

ADAPTATIONS FOR LESSON 6, FM 1 pages 14-16

DEVELOPMENT:

A. After development #2 FM 1, do Adapted Application
B. Continue with FM 1 development #3 - #5
C. Be sure to ascertain that students have mastered the performance objectives of application A, FM 1, page 15

ADAPTED APPLICATIONS:

Rewrite the following algebraic expressions as repeated multiplication:

1)	a^2	$(a\cdot a)$
2)	$3b^3$	$(3\cdot b\cdot b\cdot b\cdot)$
3)	r^4	$(r\cdot r\cdot r\cdot r)$
4)	$5m^2$	$(5\cdot m\cdot m)$
5)	$7y^4$	$(7\cdot y\cdot y\cdot y\cdot y)$
6)	$4x^5$	$(4\cdot x\cdot x\cdot x\cdot x\cdot x)$
7)	$p \cdot t^3$	$(p\cdot t\cdot t\cdot t)$
8)	$8^3 \cdot 4^2$	$(8\cdot 8\cdot 8\cdot 4\cdot 4)$
9)	$6k^1$	$(6\cdot k)$
10)	$4^2\ a^3$	$(4\cdot 4\cdot a\cdot a\cdot a)$

SUMMARY:

Have the students list and write all the steps used in rewriting and computing an algebraic expression.

Cliff Hanger May be Omitted

CALCULATOR APPLICATION:

1. Use the calculator only after application A, when students have mastered the concept of substitution for the variable with its given numerical value.
2. Use the calculator to reinforce correct usage in checking self-calculated answers.
3. Review the correct order of operations and repeated multiplication on calculator.

SUGGESTED TEST ITEMS FOR TOPIC 6

NAME ______________________________

1) Rewrite the following algebraic expressions as repeated multiplications.

a) b^3

b) $2m^2$

c) $7y^4$

d) 4^3t^2

e) x^3c^5

2. Given $x = 4$ and $y = 2$, find the value of:

a) x^3

b) $2y^3$

c) $3x + 5y^3$

d) $\frac{3y^2}{6}$

e) $y^2 + 1$

3. Using the values $p=2$, $r=3$, $s=5$, $t=10$ compute the following expressions.

a) $p + r^2 + s^3$

b) $t^2 + r^4 - p^3$

c) $6s^2$

d) $p^2 r - 9$

e) $prs + 21$

f) $\frac{ps}{p}$

g) $\frac{r^2t}{3}$

h) $3 (r + s)$

i) $t + prs$

j) $4p^2$

Topic Seven

THEME: To learn the meaning of formulas and how they are applied.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define the meaning of the word formula.
- determine where a formula must be used in everyday math problems.
- differentiate between a mathematical formula and mathematical expression.
- compute formulas where the variables have given numerical values.

VOCABULARY ADAPTATIONS:

Additional Review Terms: mathematical expression, variable
Omit: Evaluate

ADAPTATIONS FOR LESSON 7, FM 1 pages 16-18

CHALLENGE PROBLEM: (Omit Challenge Problem in FM 1.)

"Mary went to the store to buy a record album. The price of the record was $6.00 and the tax was .50¢. How much did it cost Mary to buy the record album?"

DEVELOPMENT:

A) Omit Development #1 FM 1, pg. 16. substitute the following: Discuss the challenge problem. Elicit the idea that there is a need to add both the price and the tax to determine that total cost of the record. Display this computation on the chalkboard as follows: $6.00 + $.50 = $6.50.

B) Discuss why there is a need for formulas. Some topics that can be brought in here are items such as:

1) Recipes - are really formulas on how to prepare items for cooking.
2) Student's Average - formula applies to all of the individual subject grades.
3) Baseball Batting Average - formula using number of times at bat, and number of base hits.

C) Proceed to Development #2 FM 1, Page 17.

NOTE: The major emphasis in this topic should be placed on the concept of how to use a formula, and how to substitute a given numerical value for a variable used in a math formula. It is not necessary to stress when these formulas are to be used. These items will be covered in depth at a later time. Thus, the major emphasis should be placed on Development #5 in FM 1 and the application.

SUMMARY:

After discussion of summary question in FM 1, have the students develop math formulas for the following samples: (the answers and computation are not the prime concern, but the development of the formulas themselves are!)

A) Jane received the following marks on her report card; 90 in Math, 80 in History, 85 in English and 85 in science. Develop a formula that could be used to find what Jane's AVERAGE was on that report card.
(ANSWER; $A = \frac{M + H + E + S}{4 \text{ (total of classes)}}$

B) John had a job that paid him 4 dollars every hour that he worked. He worked 5 hours on Saturday. How much did he earn on that day? (ANSWER: $E = \$4 \times h$)

C) Joseph knew that to find the number of feet in the length of a board he had to divide the number of inches by twelve. How many feet are in a board 156 inches long? (ANSWER; $f = \frac{i}{12}$)

D) Culminating Exercise for Unit 1. The following problem will require the students to demonstrate the application of skills acquired throughout Unit 1. Use FM 1 Challenge Problem for Lesson 7. In Development #1 the student will use many of the math concepts and computational skills that were present in the Adapted Performance Objectives.

SUGGESTED TEST ITEMS FOR TOPIC 7

NAME ______________________________

1) Formula or Expression? Next to each of the following, state if it is a math formula or a math expression:

   a) s^2

   b) $p = 2L + 2W$

   c) $x + y$

   d) $a + b = c$

   e) $L = A + (N - 1)d$

2) Find the value of the subject of each formula when the other variables are known;

   a) $A = LW$; $L = 4$, and $W = 7$

   b) $P = 2L + 2w$; $L = 6$ and $w = 3$

   c) $V = Lwh$; $L = 5$, $w = 2$ and $h = 8$

   d) $d = 16t^2$; $t = 2$

   e) $V = e^3$; $e = 5$

3) The formula $F = \frac{9}{5}C+32$ is used to calculate the Fahrenheit temperature when the Celsius is known. Find the Fahrenheit temperature when the Celius temperature is 10°.

4) Add:

$$\begin{array}{r} 238 \\ 27 \\ \underline{146} \end{array}$$

5) From 748 subtract 239

6) Multiply:

$$\begin{array}{r} 7352 \\ \underline{\times\ 44} \end{array}$$

7) Divide:

$25\overline{)6850}$

UNIT II — ALGEBRA

INTRODUCTION

Several major concepts are introduced or redeveloped in Unit II. These concepts must be viewed in their proper perspective. The main computational concepts are addition and subtraction of common fractions and mixed numbers. Fractions are introduced as an outgrowth of an initial study of a number line. The number line also serves as a vehicle for learning the concept of linear measurement using a ruler. The sequence of topics and themes in this unit represents one possible ordering for the development of these concepts. It is not the only possible sequence, nor may it be the best possible sequence for your particular group of students. You should feel free to re-order the topics in this unit. If this is done the development of the themes will have to change to suit their revision.

It should also be noted that reducing fractions to lowest terms is not an objective covered in this unit. This concept will be taught in a subsequent unit. It is suggested that the teacher encourage students to leave fractions such as $\frac{6}{10}$ in that form. They may be told that reducing to a "simpler form" is possible but it will not be necessary to reduce it at this time.

Topic One

THEME: To learn how to use the symbols of equality and inequality.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- compare two whole numbers verbally using the words "is equal to" for equality and using the words "is greater than" or "is less than" for inequality.
- use the symbols of equality (=), and inequality (>,<) to compare two whole numbers.
- compare two number phrases verbally, using the words "is equal to" for equality and using the words "is greater than" or "is less than" for inequality.
- use the symbols of equality (=) and inequality (>,<) to compare two number phrases.
- state whether a sentence using the symbols >, =, < is true or false.

VOCABULARY ADAPTATIONS:

Additional Review terms: symbol

ADAPTATIONS FOR LESSON 1, FM 1 pages 23-24

CHALLENGE PROBLEM:

Make each of the following statements true by using one of the expressions: is equal to; is greater than; is less than

1. 4 _____ 3 (is greater than)
2. 27 _____ 54 (is less than)
3. 18 _____ eighteen (is equal to)

DEVELOPMENT:

A. Use Adapted Challenge Problem to introduce first Adapted Performance Objective.
B. Introduce symbols of equality and inequality.

   = is equal to; < is less than: > is greater than

   NOTE: The teacher should develop a visual aid wall chart for display of these symbols in the classroom.

C. Apply symbols to Adapted Challenge Problem.
D. Proceed to challenge problem and development in FM 1.

CALCULATOR APPLICATION:

1. Students can compute the values of mathematical expressions on each side of the equality symbol to check their calculated answers.

2. The teacher should review correct order of operations and correct use of parentheses.

SUGGESTED TEST ITEMS FOR TOPIC 1

NAME ____________________________

1. Using the symbols of equality and inequality fill in the blanks to make each statement true:

   A) The symbol used to represent "is greater than" is ____________________

   B) The symbol used to represent "is less than" is ____________________

   C) The symbol used to represent "is equal to" is ____________________

2. Fill in the space with a symbol of equality or inequality to make each statement true;

   a) 8 _____ 13

   b) 11 _____ 7

   c) 30 + 20 _____ 10

   d) 81 _____ 16 + 47

   e) 3^3 _____ 2^2

   f) 3 (2 + 4) _____ 3(2) + 3(4)

   g) $7 \cdot 4 + 3$ _____ 50

   h) 3×8^2 _____ 40

3. Write the word True or False following each statement:

   a) $8 < 32$ __________

   b) $25 > 15$ __________

   c) $17 < 10$ __________

   d) $63 < 59 + 1$ __________

   e) $36 < 19 - 5$ __________

4. If $x = 6$ use the symbols of equality or inequality to make each statement true:

   a) $x + 4$ _____ 8

   b) $7x$ _____ 35

   c) $3x + 4$ _____ 17

   d) $15 - x$ _____ 9

Topic Two

THEME 1: How to order whole numbers on a number line.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- construct a number line using a unit length with end points at 0 and 1, and extending to include all whole numbers.
- locate any whole number, larger than 0, on the number line, thereby showing understanding that every whole number has a point on the line.
- compare the positions of two points on the line as to their relative size, showing an understanding that smaller is to the left and larger is to the right.
- describe the order of two lettered points on the line, using the inequality symbols > and < .
- describe the order of two numbers on the number line using the inequality symbols > and < .
- apply the rule, "if a is to the right of b, than a > b or b < a," for two lettered points on the number line.

VOCABULARY ADAPTATIONS:

Additional terms: whole number, point
Terms omitted: correspondence, rational number
Introduce in Next Theme: fraction, mixed number

ADAPTATIONS FOR LESSON 2, FM1, pages 25-27 Part 1.

A. Use the number line presented in the FM 1 Challenge Problem.

B. Substitute the following as the Challenge Problem:
What number value would you give to points b and a on this number line? Explain how you arrived at your answer.

C. Omit the discussion of one to one correspondence. Do Adapted Application #1.

D. Establish the ordering property for whole numbers and zero, eliciting the property that any number to the right of another number is the greater, or larger of the two.

ADAPTED APPLICATIONS: Prior to application A, FM 1 do application 1 which reinforces challenge problem and the first two objectives.

1) a) Locate the number 5 on the number line.
   b) Locate the number 8 on the number line.
   c) Locate the number 1 on the number line.
   d) Locate the number 7 on the number line.

NOTE: It would be advisable to put up a number line in the classroom for use as a visual aid.

2) Use an inequality symbol (> is greater than or < is less than), to show the relation between the first and the second number in each of the following pairs:

a) 5,8 (5 8)
b) 9,2 (9 2)
c) 6,3 (6 3)
d) 10,7 (10 7)
e) 1,4 (1 4)
f) 13,0 (13 0)
g) 11,14 (11 14)
h) 7,16 (7 16)
i) 15,9 (15 9)
j) 9,15 (9 15)

NOTE: Do not use FM 1, Application C for this theme.

3) Establish the rule that; "If a is to the right of b, then a $>$ b, or b $<$ a."

4) Do FM 1, pg 26, Application A.

5) Do FM 1, pg 27, Application B, #'s 1 to 5.

6) Do Adapted Application 2.

SUMMARY: Use FM 1 Summary, #'s 1 and 3

SUGGESTED TEST ITEMS FOR TOPIC 2, THEME 1

NAME_____________________________

1. What number is:

   a) 3 units to the right of 5 _____
   b) 2 units to the left of 4 _____
   c) 6 units to the right of 0 _____
   d) 1 unit to the right of 8 _____
   e) 7 units to the right of 2 _____

2. For each pair of numbers, write the number that will appear further to the right on the number line.

   a) 5,8 _____

   b) 14,2 _____

   c) 364,571 _____

   d) 0,7 _____

   e) 263,264 _____

3. Using the symbols > or < fill in the blanks below to compare the two numbers:

   a) 4_____6

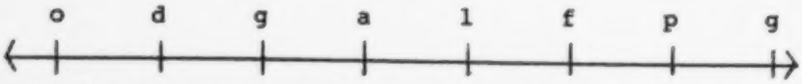
   b) 8_____3

   c) 7_____2

   d) 11_____9

   e) 14_____0

4. Use the following equally spaced points on a number line to answer the following questions;



If the left point is zero and the point d is given the value of 1, what is the value of the following letters:

f = __________ a = __________ l = __________

p = __________ g = __________

Topic Two

THEME 2: To learn the meaning of a fraction, and to locate a fraction on a number line.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

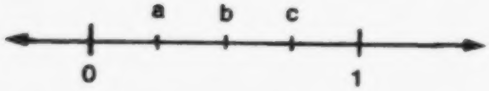
- define the meaning of a fraction.
- list what part of the regions in diagrams are shaded, through the use of fractional representation.
- define numerator and denominator.
- locate a fraction on the number line by sub-dividing a whole unit on the number line (quarter units only).
- define the meaning of a mixed number.
- locate a mixed number on the number line.

VOCABULARY ADAPTATIONS:

Additional New Terms: fraction, mixed number, numerator, denominator, square, rectangle, parallelogram, circle, quarters, fourths

ADAPTATIONS FOR LESSON 2, FM 1, pages 25-27, part 2.

CHALLENGE PROBLEM:



What numerical value would you give to point a on the number line? Explain how you arrived at your answer.

DEVELOPMENT:

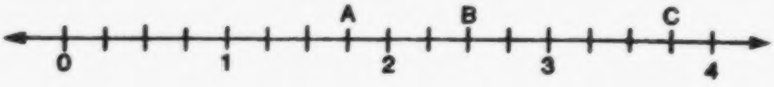
A) Discuss the Adapted Challenge Problem. Emphasize that the number value given must be greater than zero [to the right of], and yet less than 1 [to the left].

B) Discuss the method of dividing the whole number to include fractional numbers. Review the meaning of fraction as: $\frac{\text{Number of Parts Taken}}{\text{Number of Parts in the Whole}}$

C) Do Adapted Application 1

D) Use the number line in Challenge Problem. Label each point, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$

E) Extend the number line to show more than one unit with fractional parts



Elicit from students numerical value of points A, B, C,

$A = 1 + \frac{3}{4} = 1\frac{3}{4}$ $B = 2 + \frac{2}{4} = 2\frac{2}{4}$ $C = 3 + \frac{3}{4} = 3\frac{3}{4}$

F) Do Application B, #'s 6-10 in FM 1, pg 27.

G) Develop the concept of a mixed number using the number line. A mixed number is a whole number and a fraction added together, representing a whole number and the fractional part after the whole number.

H) Do Adapted Application #2.

I) Review =, <, > to compare whole numbers, fractions, and mixed numbers.

J) Do application C in FM 1 pg 27.

SUMMARY:

SUMMARY:

Answers

1. Which of the following name whole numbers?

a. $\frac{4}{5}$ b. 3 c. $2\frac{1}{2}$ d. 10 e. $\frac{5}{8}$ f. 6 (b, d, f,)

2. Which of the following name fractions?

a. $\frac{4}{8}$ b. $3\frac{1}{4}$ c. $\frac{2}{7}$ d. $\frac{10}{10}$ e. $\frac{5}{5}$ f. 6 (a, c, d, e,)

3. Which of the following name mixed numbers?

a. 5 b. $3\frac{1}{4}$ c. $\frac{5}{6}$ d. $1\frac{4}{9}$ e. $\frac{1}{2}$ f. $10\frac{2}{3}$ (b, d, f,)

4. For each pair of numbers use the signs =, <, > to compare the numbers. Use a number line for assistance.

a. 2 ____ $2\frac{1}{4}$ ( )

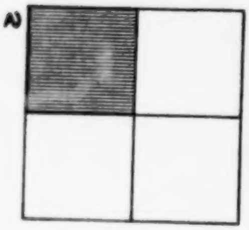
b. $5\frac{3}{4}$ ____ $5\frac{1}{4}$ ( )

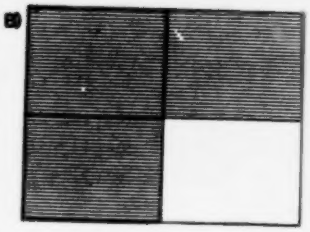
c. $\frac{4}{4}$ ____ 1 ( )

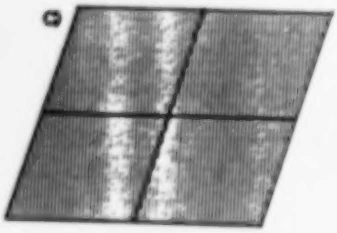
d. $6\frac{2}{4}$ ____ $3\frac{1}{4}$ ( )

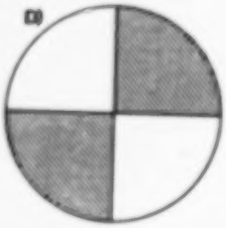
ADAPTED APPLICATIONS:

1.









Using the geometric shapes above, develop the following:

a) Each figure has a different shape, or form. Elicit the names for each figure (square, rectangle, parallelogram, circle).

b) Into how many equal parts is each figure divided? (4) A discussion should be held on the concept of a part of a whole object. Explain that the number of parts for each object will change. Introduce the vocabulary word denominator.

c) How many parts of each figure are shaded? (1,3,4 and 2). A discussion should be held on the concept of all of the parts, when put together, are equal to, or make up the whole object. Introduce the vocabulary word numerator.

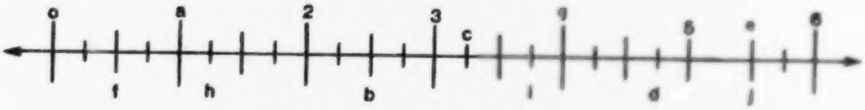
d) Name the fractional part of each of the figures that is shaded ($\frac{1}{4}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{2}{4}$).

It is important, at this time, for the teacher to elicit the numerators and denominators for each figure.

e) It would be beneficial for the teacher to impress upon the students the fact that, in the case of the parallelogram, when the numerator and the denominator are the same number ($\frac{4}{4}$) this represents one whole object, or the number 1.

f) Discuss everyday objects that are broken down into parts, such as pizza pies, basketball courts, candy bars, football fields, etc. Represent these objects as fractions.

2) Use the following number line, with equally spaced points, to answer the questions below;



a) What numerical value would you give to Point a? (1)

b) Of the letter points d, j, b and i which letter represents the largest number and which represents the smallest number? (j,b)

c) What numerical value would you give to letter points h, i, and g?
$(1\frac{1}{4}, 3\frac{3}{4}, 4)$

d) Using the number line, write the symbols <, =, or > in each space to make the statement true:

a) h_____b (<)   c) g_____4 (=)

b) e_____c (>)   d) f_____a (<)

SUGGESTED TEST ITEMS FOR TOPIC 2, THEME 2

NAME________________________________

1. For each pair of numbers name the number which will appear further to the right on a number line;

a) 4, $3\frac{1}{2}$ ____

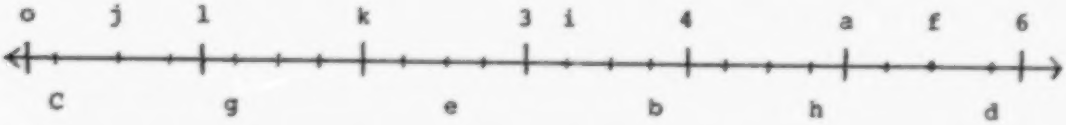
b) $1\frac{1}{4}$, $\frac{3}{4}$ ____

c) $\frac{2}{4}$, $\frac{3}{4}$ ____

d) $8\frac{3}{4}$, $8\frac{1}{4}$ ____

e) $7\frac{1}{4}$, $5\frac{1}{4}$ ____

2. Use the following number line, with equally spaced points, to answer the questions below;



a) What numerical value would you give to point:

k____

f____

b____

g____

b) Of the letter points e,j,d and f, which letter represents:

the largest number ______ the smallest number -______

c) Using the number line, write the symbols <, =, > in each space to make the statement true;

1. a___b

3. a___5

2. i___h

4. c___j

3. For each pair of numbers use the signs <, =, and > to compare the numbers:

a) 4___$4\frac{1}{2}$

b) $6\frac{3}{4}$___$6\frac{1}{4}$

c) $\frac{2}{2}$___1

d) $4\frac{2}{4}$___$3\frac{3}{4}$

e) $1\frac{1}{2}$___$1\frac{1}{4}$

Topic Three

THEME 1: To learn how to divide a number line into fractional parts $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

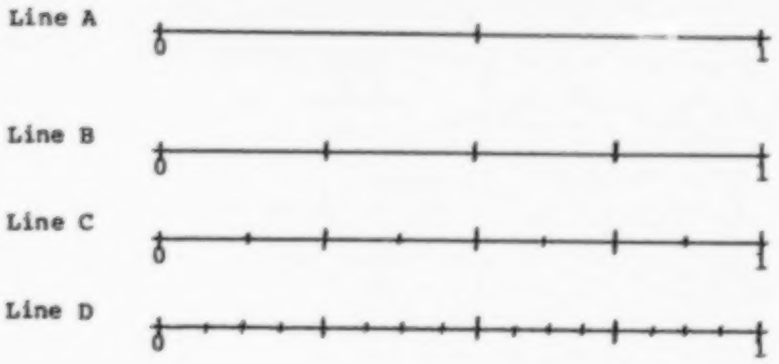
- divide a number line into two equal parts, four equal parts, eight equal parts, and sixteen equal parts.
- state the order of Unit fractions on the number line $\frac{1}{16}, \frac{1}{8}, \frac{1}{4}, \frac{1}{2}$.
- compare two fractional parts on a number line for equivalency (denominators 2,4,8,16).
- use the symbols of equality and inequality to compare two fractional numbers on the number line.
- define an improper fraction.
- change an improper fraction to a mixed number.
- change a mixed number to an improper fraction.

VOCABULARY ADAPTATIONS:

Additional terms: fractional number, halves, eighths, sixteenths
Review: fraction, mixed numerator, denominator, quarters, fourths

ADAPTATIONS FOR LESSON 3, FM 1 pages 28-30

CHALLENGE PROBLEM: Given four number lines, divide line A into two equal parts, line B into four equal parts, line C into eight equal parts and line D into sixteen equal parts. (Put blank lines on chalkboard and elicit answers from students.)



(Teacher labels end points 0,1 only students do the rest)

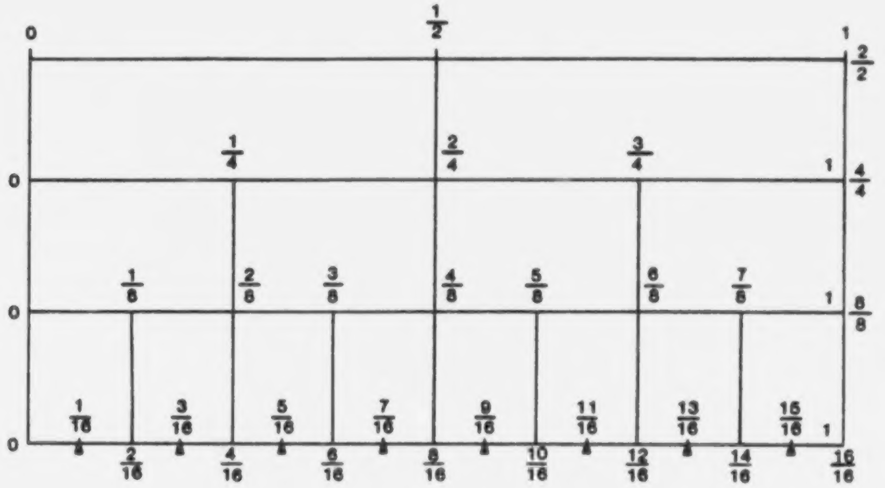
DEVELOPMENT:

A) Discuss challenge problem for first Adapted Performance Objective.

B) Using number lines developed by students, state the fraction name for each point on the number line by doing the following:

1. Ask how many parts are on Line A? After eliciting the answer 2, elicit 2 represents the number of parts in the whole and that 2 is the denominator of the fraction.
2. Label the points on the number line, $\frac{1}{2}$, meaning one out of 2 parts, and $\frac{2}{2}$ meaning two out of two parts. Emphasize that the numerator of a fraction tells the number of parts between zero and the point on the number line. The denominator is the number of parts between zero and one (the number of pieces in the whole unit).
3. Emphasize the logical development of counting the number of parts from zero to the point indicated and the number of pieces in the whole unit.
4. Repeat process 1,2,3 for lines B, C, and D.

C) Have students connect points on lines as indicated on the four lines below (be sure to connect all equivalent points).



D) From here go to Development 1,2,3, FM 1, pages 28,30.

E) Review changing an improper fraction to a mixed number.

1) The number line as in FM 1 development 6 (p.30) and develop concept that the numerator (top) can be larger than the denominator (bottom).

2) Name such a fraction as an improper fraction.
Definition: Any fraction whose numerator is larger than the denominator is called an improper fraction.

3) Do adapted application #1.

F) Change a mixed number to an improper fraction. Use method B only in FM 1 guide, development 6 (p.30)

G) Do Application D in FM 1 guide (pg. 29)

H) Change an improper fraction to a mixed number. Use method B only in FM 1 guide, development 6 (pg. 30)

I) Do application E in FM 1 guide (pg. 29)

SUMMARY:

A) Review the order of unit fractions on the number line.

B) Review the concept of equivalent fractions.

C) Review the concept of improper fractions.

D) Review the rule for changing mixed numbers to improper fractions.

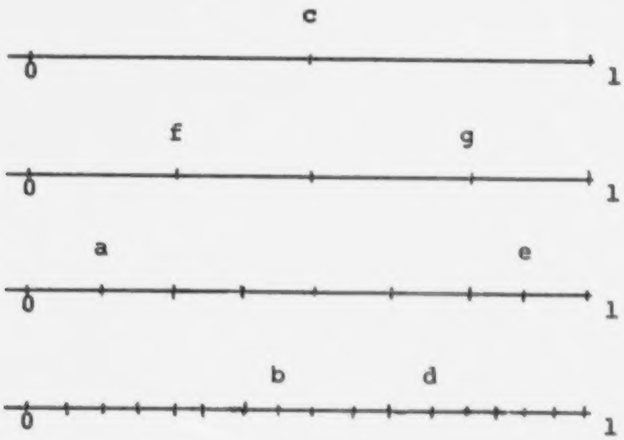
APPLICATIONS:

1. Circle the improper fractions.

    a) $\frac{4}{5}$
    b) $\frac{7}{3}$
    c) $1\frac{1}{2}$
    d) $\frac{12}{9}$
    e) $\frac{2}{8}$
    f) $3\frac{1}{4}$
    g) $\frac{10}{7}$
    h) $\frac{3}{4}$

SUGGESTED TEST ITEMS FOR TOPIC 3, THEME #1

1) Using the following four number lines with equally marked spaces, what value would you give to points listed below?



f___

d___

c___

e___

b___

2) Circle the numbers below that are improper fractions:

a. $\frac{2}{3}$ c. $2\frac{1}{2}$ e. $\frac{3}{4}$

b. $\frac{7}{5}$ d. $3\frac{3}{4}$

3) Write each of the following mixed numbers as an improper fraction:

a. $2\frac{1}{4} =$ _____

b. $1\frac{3}{8} =$ _____

c. $5\frac{1}{2} =$ _____

d. $3\frac{1}{2} =$ _____

e. $4\frac{5}{8} =$ _____

SUGGESTED TEST ITEMS FOR TOPIC 3, THEME #1 (continued)

4) Write each of the following improper fractions as a mixed number;

a. $\frac{9}{2}$ = _____

b. $\frac{15}{4}$ = _____

c. $\frac{11}{8}$ = _____

d. $\frac{14}{5}$ = _____

e. $\frac{10}{3}$ = _____

Topic Three

THEME 2: To learn how to determine equivalent fractions without the use of a number line.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

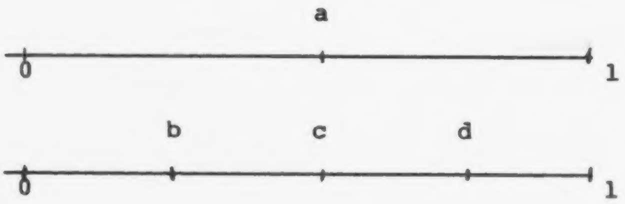
- define equivalent fractions.
- change a fraction into an equivalent fraction using the multiplication operation.

VOCABULARY ADAPTATIONS:

Additional terms: equivalent fraction

ADAPTATIONS FOR LESSON 3, FM 1 pages 28-30.

CHALLENGE PROBLEM: Using the following diagram, ask the questions:



1) Which points on both of the number lines are equal to each other?

2) How did you derive at your answer?

DEVELOPMENT:

A) Elicit answers to the challenge problem from the students. Establish that in addition to the points 0 and 1, a and c are equal. Establish that points a and c are the same distance from point 0.

B) The students should now attempt to label points a, b, c, and d using fractional numbers.

C) Discuss the fact that point a equals $\frac{1}{2}$ and point c equals $\frac{2}{4}$. Despite the fact that they have different numerators and denominators, they are still equal in value, as previously established.

D) Introduce the term equivalent fractions. Establish the fact that fractions with equal values may have different numerators and denominators.

E) Ask the students if they might be able to devise a method of finding fractions with equal values (equivalent fractions) without the use of a number line. Introduce the method of changing a fraction into an equivalent fraction, without the use of a number line, by multiplying the numerator and denominator of the fraction by the same non-zero number.

MODEL PROBLEM:

Change the fraction $\frac{1}{2}$ into an equivalent fraction with a denominator of 8.

Method:

1) The rule states that we must multiply both the top number, or numerator, and the bottom number, or deonominator, by the same non-zero number. We must find the number, which multiplied by 2 will equal 8; 2 x ? = 8 Answer: ? = 4 because 2 x 4 = 8.

2) We must now multiply both the numerator and the denominator by 4 to create the equivalent fraction: $\frac{1}{2} = \frac{4.1}{4.2} = \frac{4}{8}$

Therefore: $\frac{1}{2} = \frac{4}{8}$

6) Do Adapted Application 1.

7) Use the following model problem to demonstrate how to create equivalent fractions when you are given the values of both numerators:

MODEL PROBLEM:

Change the fraction $\frac{5}{9}$ into an equivalent fraction with a numerator of 15.

Method:

1) Which number, when multiplied by 5, will equal 15?
Solution;
5 x ? = 15 thus ? = 3, because 5 x 3 = 15

2) Now multiply both the numerator and denominator by 3;

$\frac{5}{9} = \frac{3.5}{3.9} = \frac{15}{27}$ thus $\frac{5}{9} = \frac{15}{27}$

8) Do Adapted Applications 2 and 3.

SUMMARY: Following application #3, have individual students come to the board and write one of their fractions on the board omitting either the denominator or the numerator. Other students will try to find the missing denominator. This can be a team activity.

ADAPTED APPLICATIONS:

1) Change each of the following fractions to an equivalent fraction by using the opeation of multiplication.

	Answers
a. $\frac{3}{4} = \frac{\_\_}{16}$	(12)
b. $\frac{1}{4} = \frac{\_}{8}$	(2)
c. $\frac{5}{8} = \frac{\_\_}{16}$	(10)
d. $\frac{1}{2} = \frac{\_\_}{50}$	(25)
e. $\frac{3}{3} = \frac{\_}{6}$	(6)
f. $\frac{5}{11} = \frac{\_\_}{55}$	(25)
g. $\frac{7}{10} = \frac{\_\_}{70}$	(49)

2) For each question mark put in the number that will make the fractions equivalent.

	Answers
a. $\frac{?}{3} = \frac{2}{6}$	(1)
b. $\frac{5}{8} = \frac{?}{16}$	(10)
c. $\frac{6}{?} = \frac{36}{42}$	(7)
d. $\frac{4}{9} = \frac{16}{?}$	(36)
e. $\frac{1}{2} = \frac{?}{8}$	(4)
f. $\frac{3}{10} = \frac{?}{100}$	(30)
g. $\frac{7}{8} = \frac{?}{16}$	(14)

3) Change the following fractions to any equivalent fraction.

a. $\frac{2}{3}$

b. $\frac{9}{16}$

c. $\frac{4}{9}$

d. $\frac{7}{8}$

e. $\frac{5}{12}$

SUGGESTED TEST ITEMS FOR TOPIC 3, THEME 2

1) Change each of the following fractions into an equivalent fractions with the denominator shown.

a) $\frac{1}{4} = \frac{\_\_}{16}$

b) $\frac{3}{4} = \frac{\_}{8}$

c) $\frac{7}{8} = \frac{\_\_}{16}$

d) $\frac{1}{2} = \frac{\_\_}{20}$

e) $\frac{4}{4} = \frac{\_}{8}$

f) $\frac{3}{11} = \frac{\_\_}{33}$

g) $\frac{4}{10} = \frac{\_\_}{40}$

2) For each blank fill in the number that will make the fractions equivalent;

a) $\frac{\_}{3} = \frac{4}{6}$

b) $\frac{3}{8} = \frac{\_\_}{16}$

c) $\frac{6}{\_} = \frac{30}{35}$

d) $\frac{3}{9} = \frac{9}{\_}$

e) $\frac{1}{2} = \frac{\_}{8}$

f) $\frac{7}{10} = \frac{21}{\_\_}$

g) $\frac{4}{8} = \frac{\_\_}{16}$

3) Change the following fractions to any equivalent fraction, whose denominator is different from the one given.

a) $\frac{3}{4} = \_$

b) $\frac{5}{16} = \_$

c) $\frac{1}{5} = \_$

d) $\frac{2}{9} = \_$

e) $\frac{6}{10} = \_\_$

f) $\frac{1}{2} = \_$

Topic Four

THEME: To learn how to read a ruler.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define a ruler and describe it's uses.
- read and label the markings on a ruler (up to eighths).
- measure line segments with a ruler.
- recognize and label equivalent fractions on two different rulers.
- name line segments using two capital letters, or one small letter.
- compare lengths of line segments.

VOCABULARY ADAPTATIONS:

Review: halves, quarters, fourths, eighths
Omit: lowest terms

ADAPTATIONS FOR LESSON 4, FM 1 pages 31-33.

CHALLENGE PROBLEM: The teacher should hold a short motivational discussion, at the beginning of the topic based upon the following questions.

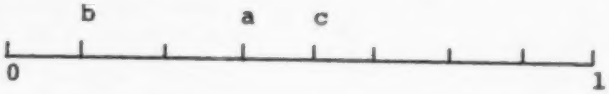
a) What are some of the tools of measurement? How are they used?

b) What types of measurement can we use a ruler for?

c) What are the different markings on a ruler used for?

d) Have we worked with anything in our math class that is similar to a ruler? (Elicit - a number line).

e)



1) Name the fractional numbers, on the number line for points a,b, and c.

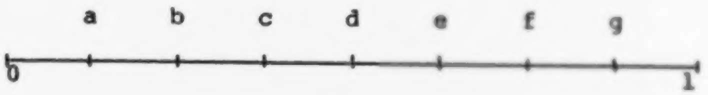
2) Name one equivalent fraction for each of the points.

DEVELOPMENT:

A) After the discussion of the challenge problem, define ruler as a tool of measurement that measures length. Some rulers use the unit of measure called the inch. The spaces between the whole numbers are each one inch in length. The symbol for inch is ("). (The abbreviation for inch is in.)

B) Provide a ruler which is divided into eighths to each student.

C) Construct a number line on the board that is divided into eighths. Letter each marking on the number line. (Please note that students with differentiated needs may omit using a ruler that is divided into sixteenths.



D) Compare the letters on the number line with the lines marked on the ruler.

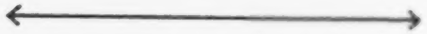
E) Do Application A-1 in FM 1, pg. 32.

NOTE: In application A-1 the ruler has no marking at point D. Omit from your rexograph. As a motivational device, pose the question verbally: "What length would you give if you were measuring a piece of metal and the end of the piece fell at point D?" Elicit at this time that the ruler can be broken into smaller pieces

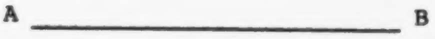
F) Do Application A-2 in FM 1 (pg. 32)

G) Review improper fractions and mixed numbers and how to change from one to another.

H) Introduce the concept of a line. Indicate that a line is shown with an arrowhead at each end. This means that it is endless in both directions. Show on board:



I) Define line segment as the part of a line between two of its points. We know it is a line segment because there are no arrowheads on the ends. It is labelled either by two capital letters, one at either end, or by a small letter in the middle.



Demonstrate proper use of the ruler.

1) left-right application
2) start at zero where zero is indicated
3) start at left edge where zero is not indicated

VISUAL AID SUGGESTION: The teacher should have a large ruler chart displayed prominently in the classroom.

J) Do applications B,C,D, in FM 1 guide, p 32,33.

NOTE: Omit the note at bottom of FM 1 pg. 32.

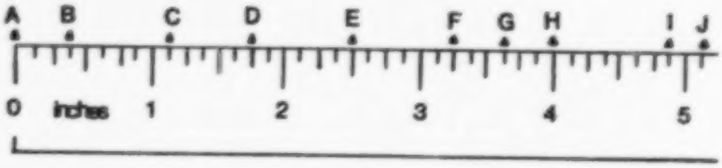
SUMMARY: Have students complete the following sentences.

1. Start counting from the _____ edge of the ruler, when measuring length.
2. The zero point on the ruler can be found on the _____ edge.
3. A line has no endpoints, but a line segment has _____ endpoints.
4. You need _____ capital letters to name a line segment.

SUGGESTED TEST ITEMS FOR TOPIC 4

NAME: ______________________

1)

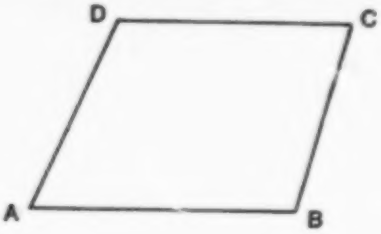


Using the ruler shown, write the numerical value that corresponds to each letter point on the ruler;

A _____ C _____ E _____ G ____ I _____

B _____ D _____ F _____ H ____ J _____

2) Using your ruler, find the measure of each side shown, and name each line segment in the diagram below.



Line Segment	Measure
____________	____________
____________	____________
____________	____________
____________	____________

Arrange the measures in order from smallest to largest:

__________ __________ __________ __________

3) a) When reading a ruler, how many $\frac{1}{2}$ inch spaces are there in 3 $\frac{1}{2}$ inches? _____

b) When reading a ruler, how many $\frac{1}{4}$ inch spaces are there in 2 $\frac{3}{4}$ inches?

Topic Five

THEME: To learn how to show change by using numbers that show direction (negative, positive and zero).

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- give meaning to a positive number and a negative number, and define these as signed numbers.
- use zero as representing no change.
- represent left and right by signed numbers.
- represent above and below zero by signed numbers.
- write the opposite of a given situation.
- write the opposite of a given signed number.

VOCABULARY ADAPTATIONS:

Additional terms: forward, backward, debt

ADAPTATIONS FOR LESSON 5, FM 1 pages 34-35.

CHALLENGE PROBLEMS:

1) If you received an 85 in Math for the first marking period, and a 90 in math for the second marking period, how could you represent the change in your mark using words?

2) If you received a 90 in science for the first marking period, and a 90 in science for the second marking period, how could you represent the change in your mark using words?

3) If your mark for the first marking period was 85, and 75 for the second marking period, how would you represent the change in your mark using words?

DEVELOPMENT:

A) In discussing the challenge problems, elicit the idea that the changes in the grade can be described as either positive, negative, or no change.

B) On the chalkboard the teacher should list, under the words positive change or negative change, the different words or phrases that were elicited from the students.

C) List the following rules of change on the chalkboard:

   1) When numbers are used to represent positive changes, they are written with a plus (+) sign before the number.

   2) When numbers are used to represent negative changes, they are written with a minus (-) sign before the number.

   3) The number zero, 0, is used to represent no change.

Note: The teacher must stress that positive numbers are not to be called plus numbers, and that negative numbers are not to be called minus numbers.

D) Proceed to Development 2 in FM 1 Page 34. Continue with the lesson as presented in the FM 1 guide.

SUMMARY: Use the Challenge Problem, and Application A found in Page 34 in FM 1 as part of the summary.

SUGGESTED TEST ITEMS FOR TOPIC 5

NAME: ______________________________

1) a) When numbers are used to represent positive changes, they are written with a _____ sign before the number.

   b) When numbers are used to represent negative changes, they are written with a _____ sign before the number.

   c) The number _____ is used to represent no change.

   d) Any number without a sign in front of it is a __________ number.

2) Represent each of the following situations as a signed number.

   a) losing $5\frac{1}{2}$ pounds _____

   b) taking out $8 from the bank _____

   c) improving your grade by 10 points _____

   d) 27 cent decrease in price _____

   e) increase in earnings of $15 _____

   f) the rise in cost of bread by 8¢ _____

   g) gaining 5 yards in football _____

   h) 5 points below the average _____

   i) the price falling by $2 _____

   j) a profit of $25 _____

3) Describe in words, the opposite of each of these situations;

   a) earning $20 ____

   b) a deposit of $32 ____

   c) a rise in grades of 8 points ______________________________

   d) a 20 yard loss in football ________________________________

   e) a decrease of profit of $17 _______________________________

   f) gaining $6\frac{1}{4}$ pounds ______________________________

Topic Six

THEME: To learn how to extend a number line to include negative numbers.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

Same as FM 1 Guide, pg. 36.

VOCABULARY ADAPTATIONS:

Delete: one-to-one correspondence.

ADAPTATIONS FOR LESSON 6, FM 1 pages 36-39

DEVELOPMENT:

A) After referring to challenge problem in FM 1 pg. 36, include a visual aid of a thermometer to demonstrate the rise and fall of temperature above and below zero.

B) Preceding Development 2 in FM 1 define an integer as "Any positive or negative whole number, and zero." Continue with Development 2 on pg. 36.

C) In Development 6, FM 1, page 38, omit the reference to one-to-one correspondence.

D) After Application A, do Adapted Application #2.

E) Prior to Development 9, Application B, in FM 1 guide, pgs 38-39. Use Adapted Application #2.

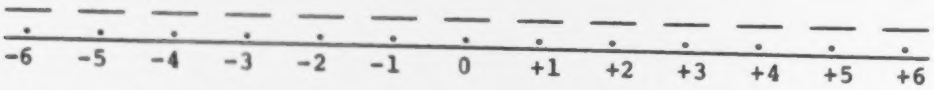
F) Do Development 9, 10, and 11 on pgs 38-39 in the FM 1 guide.

G) Omit Summary in FM 1 guide, page 39. Use the adapted summary.

ADAPTED APPLICATIONS:

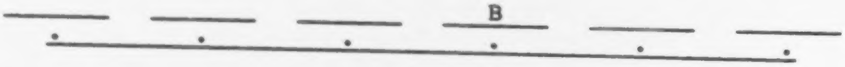
1) Directions: Below you see pairs of letters and numbers. Write each letter above the number line at the point that corresponds to it's number. The name of a famous sports personality will appear!

I	-2	E	-1	N	+6
K	+3	J	0	A	+1
G	-4	C	+2	E	-5
0	+5	R	-6	S	+4
				G	-3



ANSWER: (R) (E) (G) (G) (I) (E) (J) (A) (C) (K) (S) (O) (N)

2) Directions: In the drawing below each line represents a letter. Following the instructions below, fill in each blank with the appropriate letter. The letter B has already been filled in for you. REMEMBER: Any movement to the left is negative (-) movement, and any movement to the right is positive (+) movement.



a) From B to N is -3 spaces
b) From N to M is +2 spaces
c) From M to R is +3 spaces
d) From R to E is -1 spaces
e) From E to U is -3 spaces

What is the hidden word? (Answer; Number)

SUMMARY: Name the signed number that is described in each of the following:

a) A number that is 7 units to the left of 0 (-7)

b) A number that is 3 units to the right of 0 (+3)

c) a number that is 4 units to the right of +5 (+9)

d) A number that is 6 units to the left of -2 (-8)

e) A number that is 5 units to the left of +1 (-4)

f) A number that is 4 units to the right of -3 (+1)

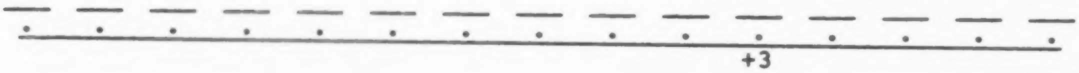
g) A number that is 6 units to the left of +6 (0)

SUGGESTED TEST ITEMS FOR TOPIC 6

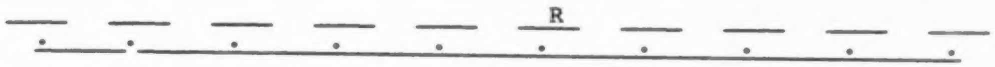
NAME: ______________________

1) Using the pairs of letters and numbers below, fill in the letters in their proper spaces on the number line to complete the word phrase below;

D	-4	U	-6	M	+4	T	+6
H	+7	N	0	N	-5	M	-2
E	-1	L	+3	T	+1	A	+2
A	+5	F	-7	A	-3		



2) In the drawing below each blank represents a letter. Following the instructions for each letter fill in each blank with the appropriate letter. Start with the letter "R" that has been filled in for you.



a) From R to N is +3 spaces.

b) From N to B is -5 spaces.

c) From B to I is +4 spaces.

d) From I to E is -3 spaces.

e) From E to L is +2 spaces.

f) From L to M is -4 spaces.

g) From M to N is -2 spaces.

h) From N to E is +9 spaces.

i) From E to U is -8 spaces.

3) Name the signed number that is described in each of the following phrases:

a) A number that is 5 units to the left of +6 is _____

b) A number that is 3 units to the right of -5 is _____

c) A number that is 8 units to the left of 0 is _____

d) A number that is 6 units to the right of -2 is _____

e) A number that is 4 units to the left of +1 is _____

f) A number that is 7 units to the right of -7 is _____

Topic Seven

THEME: To learn how to order positive numbers, negative numbers and zero, on a number line.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state the order of two positive whole numbers in terms of their relative position on a number line. (left-right)
- express the order of two positive whole numbers, in terms of inequality (> , <)
- state the order of two negative whole numbers, in terms of their position on a number line. (left-right)
- express the order of two negative whole numbers, using the terms of inequality (> , <).
- use the ordering symbols for all signed numbers.
- order numbers from least to greatest.

VOCABULARY ADAPTATIONS:

None

ADAPTATIONS FOR LESSON 7, FM 1 pgs 40-42

CALCULATOR APPLICATION:

A) At 7:00 AM on Monday the thermometer showed a temperature of eight degrees above zero ($+8^{\circ}$). On Thursday, a temperature of four degrees above zero ($+4^{\circ}$) was recorded. Which is the higher of these two temperatures?

B) See FM 1 guide, pg 40, challenge problem.

C) On Wednesday, the thermometer showed a temperature of three degrees above zero ($+3^{\circ}$). On Saturday a temperature of seven degrees below zero (-7°) was recorded? Which is the higher of these two temperatures?

DEVELOPMENT:

A) Elicit the correct answer to challenge A from the students. Demonstrate, on the chalkboard, the position of these two numbers on a number line.

1) Eight degrees above zero (+8) is located to the right of four degrees above zero (+4).

2) $+8^{\circ}$, as established from challenge problem A, is more than $+4^{\circ}$.

3) Therefore, $+8^{\circ}$ is greater than $+4^{\circ}$ and $+8^{\circ}$ is to the right of $+4^{\circ}$, on the number line.

B) Discuss the challenge problem in FM 1, page 40. Elicit the correct answer from the students. Demonstrate, on the chalkboard, the position of these two numbers on a number line. Establish the direction relation for negative numbers, on a number line.

1) Two degrees below zero is located to the right of six degrees below zero.

2) -2°, as established from the challenge problem, is more than -6°.

3) Therefore, -2° is greater than -6°, and -2° is to the right of -6°, on the number line.

C) Discuss challenge problem C. Again elicit the correct answer and demonstrate the positions of the two numbers on a number line. Establish the direction of positive and negative numbers on a number line.

1) Three degrees above zero is located to the right of seven degrees below zero.

2) +3°, as established from challenge problem C, is more than -7°.

3) Therefore, +3° > -7°, and +3° is to the right of -7° on the number line.

D) To reinforce these objectives the teacher should return to the FM 1 guide and proceed with developments 1 and 2 on pgs 40-41.

E) Preceding Application A (FM 1 guide - pg 41) use Adapted application #1.

F) Return to FM 1 guide, pg 41, and do Application A.

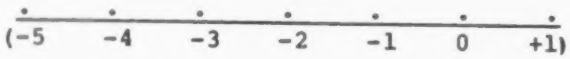
G) Omit Development #3 and 4, Application B and C, in this theme.

H) Introduce the concept of comparing the relationship of 2 or more signed numbers in order from least to greatest.

EXAMPLE:

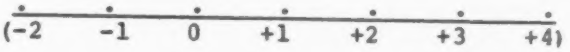
1) Two signed numbers: How would you compare -5 and -3

ANSWER; -3 is higher in value than -5 because -3 is closer to zero than -5. For example, if you owed someone $5, which could be represented as -5, and if you owed someone $3.00 which could be represented by -3, you would realize that -3 was higher in value than -5.



2) Three signed numbers. How would you compare -2, +1 and +4?

ANSWER; +4 would have the greatest value and -2 would have the lowest value.



I) Do Adapted Applications 5 and 6.

SUMMARY:

1) When comparing two numbers, the smaller number is farther to the ________. (left).

2) When comparing two numbers the larger number is farther to the ________. (right)

3) Zero (0) is to the ________ of -7 (right)

4) All positive numbers are ________ than negative numbers (greater)

ADAPTED APPLICATIONS:

B	G	R	Z	M	K	F	D	P	A	J	T	L	C	X	E	Y	H	O
-9	-8	-7	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	+7	+8	+9

1) On the number line above, which shows the greater number?

   a. P or Z (P)

   b. E or T (E)

   c. L or R (L)

   d. F or A (A)

2) On the number line above, which shows the smaller number?

   a. J or H (J)

   b. C or G (G)

   c. A or K (K)

   d. X or D (D)

3) In each set of numbers below which number is further to the right on the number line?

   a. +3 or +6 (+6)

   b. +5 or -2 (+5)

   c. 0 or +4 (+4)

   d. -8 or +9 (+9)

   e. 0 or -7 (0)

   f. -6 or -5 (-5)

4. Using the symbols > or <, fill in the blanks below to show the correct relationship between each pair of numbers. (Use the number line to help you.)

a. -4 _____ +5 (<)

b. 0 _____ -6 (>)

c. +3 _____ -8 (>)

d. -8 _____ -9 (>)

e. +7 _____ +2 (>)

f. -3 _____ 0 (<)

5) Select the largest number in each of the following:

a. 7,3,-9 (7)

b. 2,8,6 (8)

c. 5, -4, -9 (5)

d. -15,7,2 (7)

e. -5, -8, -3 (-3)

f. -9, -12, -4 (-4)

6) Put the following groups of numbers in order from least to greatest:

a. -3,5,0 (-3,0,5)

b. -8, 7, -3 (-8,-3,7)

c. +3,-4,0 (-4,0,+3)

d. -6,10,2 (-6,2,10)

e. -9,-12,9 (-12,-9,9)

f. -3,5,-6 (-6,-3,5)

SUGGESTED TEST ITEMS FOR TOPIC 7, THEME #1

NAME: ____________________

1) Which is the higher temperatures?

a. +2°, +5° _____

b. +6°, -8° _____

c. -7°, +10° _____

d. -1°, -3° _____

2) In each set of numbers below, which number is further to the right on the number line.

a. +2, +4 _____

b. +6, -3 _____

c. 0, +8 _____

d. -9, -10 _____

3) Using the symbols >, < fill in the blanks below to show the correct relationship between the two numbers.

a. -5 _____ +6

b. 0 _____ -7

c. -10 _____ -11

d. +4 _____ -9

4) Select the largest number in each of the following:

a. 8,4,-10 _____

b. 3,9,7 _____

c. 6,-5,-10 _____

d. -7,-9,-4 _____

5) Put the following groups of numbers in order from least to greatest;

a. -4,6,0 __________

b. -9,8,-3 __________

c. 4,-5,0 __________

d. -7,11,3 __________

Topic Seven

THEME 2: To learn how to order fractional numbers through the use of a least common denominator (LCD)

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define the least common denominator.
- find the least common denominator for two unlike fractions, where the denominator of one is a multiple of the denominator of the other.
- using the symbols of equality and inequality ($>$, $=$, $<$), compare the value of two unlike fractions (positive numbers only)

VOCABULARY ADAPTATIONS:

Additional New Terms:	least common denominator (LCD)
Additional Review Terms:	fractions, equivalent, numerator, denominator

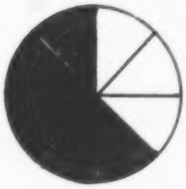
ADAPTATIONS FOR LESSON 7, FM 1 pages 40-42

CHALLENGE PROBLEM: If Tony ate $\frac{5}{8}$ of a pizza pie, and Derrick ate $\frac{3}{4}$ of a pizza pie, how could you tell which boy ate the most pizza?

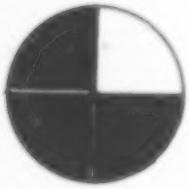
DEVELOPMENT:

A) Elicit the fact that you could look at the remains of both pizzas to see who ate the most. Demonstrate this visually on the chalkboard using the following diagrams;

Tony's Pie ($\frac{5}{8}$)



Derrick's Pie ($\frac{3}{4}$)



B) After using this visual method of determining the answer to the challenge problem, ask the students if anyone can devise a mathematical method forgetting the answer. Elicit the concept of comparing the fractions.

C) Review the concept of EQUIVALENT FRACTIONS, through the use of a number line, as in Topic 3.

D) Emphasize the fact that fractions with the same denominators can be compared and that the fraction with the larger numerator has the greater value. Example $\frac{5}{8} > \frac{3}{8}$.

E) Introduce the concept that to compare two fractions with different denominators, without the use of number lines or diagrams, it is necessary to change the fractions so that they have the same denominators.

F) Using the challenge problem, demonstrate the method used to change fractions so that they will have the same denominator. Elicit the method of dividing the larger denominator by the smaller denominator. If the result of this division is a whole number, then that larger denominator will be the common denominator for both fractions. Example: Compare $\frac{5}{8}$ and $\frac{3}{4}$.

1) Since the denominators are different, we must change the fractions so that the denominators become the same.

2) Divide the larger denominator (8) by the smaller denominator (4). $8 \div 4 = 2$.

3) The result is a whole number. Thus 8 will be a common denominator for both fractions. 8 is the least common denominator for the two fractions.

G) Do Adapted Application 1.

H) To change $\frac{3}{4}$ into an equivalent fraction with a denominator of 8 we must multiply both the numerator and denominator by the same number. Thus, $\frac{3}{4} = \frac{?}{8}$ Since $4 \times 2 = 8$, multiply the numerator (3) by the number 2. Therefore, $\frac{3 \times 2}{4 \times 2} = \frac{6}{8}$.

I) Do Application 2.

J) Now that both fractions have the same denominator we can compare them. since the fraction $\frac{6}{8}$ has a larger numerator than $\frac{5}{8}$ it is the larger fraction.

K) Thus, since $\frac{3}{4}$ and $\frac{6}{8}$ are equivalent fractions, and since $\frac{6}{8}$ is greater than $\frac{5}{8}$ it follows that $\frac{3}{4}$ is greater than $\frac{5}{8}$

$\frac{3}{4} = \frac{6}{8}$ $\qquad$ $\frac{6}{8} > \frac{5}{8}$ $\qquad$ So $\frac{3}{4} > \frac{5}{8}$

L) Do Adapted Applications #'s 3 and 4.

SUMMARY: Fill in the blanks in the sentences below.

a) When comparing two fractions on a number line the smaller of the two fractions is located to the (left).

b) When two fractions name the same number, they are called (equivalent) fractions.

c) To get an equivalent fraction, we multiply the (numerator) and the (denominator) by the same non-zero number.

d) The smallest common denominator is known as the (least common denominator).

ADAPTED APPLICATIONS:

1) Find the least common denominator for each pair of fractions.

a) $\frac{1}{3}$ and $\frac{7}{12}$ (12)

b) $\frac{1}{2}$ and $\frac{3}{10}$ (10)

c) $\frac{5}{8}$ and $\frac{1}{2}$ (8)

d) $\frac{7}{10}$ and $\frac{8}{30}$ (30)

e) $\frac{1}{5}$ and $\frac{4}{15}$ (15)

f) $\frac{3}{4}$, $\frac{4}{5}$ and $\frac{3}{20}$ (20)

81

2) Fill in the missing number to make each statement true.

a) $\frac{1}{4} = \frac{(2)}{8}$

b) $\frac{2}{3} = \frac{(6)}{9}$

c) $\frac{5}{9} = \frac{45}{(81)}$

d) $\frac{11}{20} = \frac{(44)}{80}$

e) $\frac{3}{5} = \frac{9}{(15)}$

f) $\frac{1}{6} = \frac{3}{(18)}$

3) Which is the larger?

a. $\frac{3}{7}$ or $\frac{1}{7}$ $\frac{(3)}{7}$

b. $\frac{5}{10}$ or $\frac{2}{10}$ $\frac{(5)}{10}$

c. $\frac{1}{3}$ or $\frac{3}{3}$ $\frac{(3)}{3}$

d. $\frac{3}{4}$ or $\frac{5}{8}$ $\frac{(3)}{4}$

e. $\frac{5}{12}$ or $\frac{3}{6}$ $\frac{(3)}{6}$

f. $\frac{3}{10}$ or $\frac{1}{20}$ $\frac{(3)}{10}$

g. $\frac{5}{9}$ or $\frac{2}{27}$ $\frac{(5)}{9}$

h. $\frac{4}{5}$ or $\frac{7}{15}$ $\frac{(4)}{5}$

4) Fill in the blank with the symbol "$>$, $=$, or $<$" to make each statement true.

a. $\frac{1}{2} \underline{\qquad} \frac{5}{8}$ (<)

b. $\frac{5}{9} \underline{\qquad} \frac{2}{3}$ (<)

c. $\frac{3}{4} \underline{\qquad} \frac{7}{12}$ (>)

d. $\frac{2}{3} \underline{\qquad} \frac{4}{6}$ (=)

e. $\frac{5}{5} \underline{\qquad} \frac{10}{10}$ (=)

f. $\frac{6}{7} \underline{\qquad} \frac{3}{21}$ (>)

g. $\frac{3}{5} \underline{\qquad} \frac{7}{20}$ (>)

h. $\frac{2}{11} \underline{\qquad} \frac{0}{22}$ (>)

SUGGESTED TEST ITEMS FOR TOPIC 7, THEME #2

NAME: ______________________________

1) Find the least common denominator (LCD) for each group of fractions:

a. $\frac{2}{3}$ and $\frac{5}{12}$ _____

b. $\frac{1}{2}$ and $\frac{7}{10}$ _____

c. $\frac{3}{8}$ and $\frac{1}{2}$ _____

d. $\frac{1}{10}$ and $\frac{7}{20}$ _____

e. $\frac{3}{5}$ and $\frac{7}{15}$ _____

2) Fill in the missing number to make each statement true:

a. $\frac{3}{4} = \frac{\quad}{8}$

b. $\frac{1}{3} = \frac{\quad}{9}$

c. $\frac{2}{9} = \frac{18}{\quad}$

d. $\frac{3}{5} = \frac{6}{\quad}$

e. $\frac{5}{6} = \frac{\quad}{18}$

3) Which is the larger number?

a. $\frac{5}{7}$, $\frac{1}{7}$ _____

b. $\frac{3}{10}$, $\frac{9}{10}$ _____

c. $\frac{1}{4}$, $\frac{3}{8}$ _____

d. $\frac{7}{10}$, $\frac{8}{20}$ _____

e. $\frac{2}{9}$, $\frac{5}{27}$ _____

4) Use the symbols $<$, $=$, or $>$ to make each statement true:

a. $\frac{1}{2}$ _____ $\frac{1}{3}$

b. $\frac{2}{9}$ _____ $\frac{1}{3}$

c. $\frac{3}{4}$ _____ $\frac{5}{12}$

d. $\frac{2}{3}$ _____ $\frac{5}{6}$

e. $\frac{4}{4}$ _____ $\frac{8}{8}$

Topic Eight

THEME: To learn how to compare two fractions where the denominators are not multiples of each other (positive numbers only).

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- find the least common denominator of two fractions (positive numbers only) with unlike denominators where the denominators are not multiples of each other.
- use the symbols $>$, $=$, or $<$ to compare fractions (positive numbers only) with unlike denominators.

VOCABULARY ADAPTATIONS:

Additional New Terms: multiples

ADAPTATIONS FOR LESSON 8, pages 43-45

CHALLENGE PROBLEM:

"Which is larger $\frac{2}{3}$ or $\frac{3}{4}$?"

NOTE: Do not deal with fractions which are negative numbers.

DEVELOPMENT:

A) Follow steps 1 and 2 in FM 1 p. 43. (Delete negative signs in development 2. Make all numbers positive)

B) A more concrete method for finding the LCD for fractions with unlike denominators where the denominators are not multiples of each other is as follows:

Use fractions $\frac{2}{3}$ and $\frac{3}{4}$ from challenge problem and have students find multiples of each denominator.

multiples of 3: 3,6,9,12,15,18,21,24
multiples of 4: 4,8,12,16,20,24

Using the above method have the students circle all the numbers that appear in both rows. Indicate that these are called common multiples because they are multiples of both numbers. All numbers have more than one common multiple. The least common multiple is the smallest number that appears in both rows.

D. Do adapted applications 1 and 2 and omit Applications A,B, and C in FM 1, pgs 44 and 45.

E. Change $\frac{2}{3}$ and $\frac{3}{4}$ to fractions with denominators of 12 (LCD).

So that $\frac{2}{3} = \frac{8}{12}$ and $\frac{3}{4} = \frac{9}{12}$ (Refer to previous theme)

F. Compare $\frac{8}{12}$ and $\frac{9}{12}$. $\frac{8}{12}$ is less than $\frac{9}{12}$ therefore $\frac{2}{3}$ is less than $\frac{3}{4}$.

G. Do Adapted Applications 3, and 4, and 5.

SUMMARY: Fill in the blanks below:

1. The numbers 2,4,6,8,10 are called (multiples) of the number 2.
2. Numbers that are in the set of multiples of both 3 and 5 are called (common multiples) of 3 and 5.
3. Fractions that have different numerators and denominators but have the same value and (equivalent fractions).
4. Another way of saying the smallest common multiple is the (least) common multiple.

Suggestion to teacher: As an aid to students to find multiples of the numbers 2-12, it is suggested that charts depicting multiplication tables be displayed in the classroom, i.e.,

(Use the number that you are multiplying by as the second number in the number sentence)

1 x 2 = 2
2 x 2 = 4
3 x 2 = 6
4 x 2 = 8
5 x 2 = 10
6 x 2 = 12
7 x 2 = 14
8 x 2 = 16
9 x 2 = 18
10 x 2 = 20
11 x 2 = 22
12 x 2 = 24

ADAPTED APPLICATIONS:

1) Find two common multiples for each pair of numbers. (Some possible answers indicated.)

		Answers			Answers
a.	3,5	(15,30)	e.	3,8	(24,48)
b.	2,7	(14,28)	f.	5,9	(45,90)
c.	9,6	(18,36)	g.	10,7	(70,140)
d.	10,4	(20,40)	h.	15,20	(60,120)

2) Find the least common denominator for the following fractions:

		Answers			Answers
a.	$\frac{1}{3}$ and $\frac{3}{8}$	(24)	f.	$\frac{1}{2}$ and $\frac{3}{5}$	(10)
b.	$\frac{3}{4}$ and $\frac{4}{5}$	(20)	g.	$\frac{2}{3}$ and $\frac{1}{5}$	(15)
c.	$\frac{1}{2}$ and $\frac{2}{7}$	(14)	h.	$\frac{3}{7}$ and $\frac{4}{9}$	(63)
d.	$\frac{2}{5}$ and $\frac{4}{9}$	(45)	i.	$\frac{1}{4}$ and $\frac{5}{6}$	(12)
e.	$\frac{1}{6}$ and $\frac{5}{8}$	(24)	j.	$\frac{2}{3}$ and $\frac{3}{10}$	(30)

3) Change the following fractions so that they are equivalent fractions with the least common denominator:

		Answers			Answers
a.	$\frac{1}{4}, \frac{2}{5}$	$\frac{5}{20}, \frac{8}{20}$	f.	$\frac{5}{8}, \frac{3}{5}$	$\frac{25}{40}, \frac{24}{40}$
b.	$\frac{2}{3}, \frac{4}{7}$	$\frac{14}{21}, \frac{12}{21}$	g.	$\frac{1}{3}, \frac{3}{10}$	$\frac{10}{30}, \frac{9}{30}$
c.	$\frac{1}{2}, \frac{5}{6}$	$\frac{3}{6}, \frac{5}{6}$	h.	$\frac{1}{2}, \frac{2}{9}$	$\frac{9}{18}, \frac{4}{18}$
d.	$\frac{2}{9}, \frac{3}{4}$	$\frac{8}{36}, \frac{27}{36}$	i.	$\frac{2}{7}, \frac{5}{8}$	$\frac{16}{56}, \frac{35}{56}$
e.	$\frac{3}{10}, \frac{5}{6}$	$\frac{9}{30}, \frac{25}{30}$	j.	$\frac{7}{10}, \frac{4}{15}$	$\frac{21}{30}, \frac{8}{30}$

4) Answer True, or False for the following

a. $\frac{2}{3} > \frac{1}{2}$ (True)

b. $\frac{4}{9} < \frac{3}{8}$ (False)

c. $\frac{1}{4} > \frac{3}{10}$ (False)

d. $\frac{2}{5} < \frac{1}{2}$ (True)

e. $\frac{3}{7} < \frac{4}{9}$ (True)

f. $\frac{1}{3} > \frac{2}{7}$ (True)

g. $\frac{7}{10} > \frac{2}{3}$ (True)

h. $\frac{2}{5} < \frac{3}{8}$ (False)

i. $\frac{5}{6} > \frac{4}{5}$ (True)

j. $\frac{4}{7} > \frac{3}{5}$ (False)

5) In the space provided, fill in the correct symbol of equality or inequality (<, =, >):

a. $\frac{1}{4}$ ______ $\frac{2}{7}$ (<)

b. $\frac{3}{8}$ ______ $\frac{1}{3}$ (>)

c. $\frac{2}{5}$ ______ $\frac{3}{9}$ (>)

d. $\frac{1}{2}$ ______ $\frac{4}{7}$ (<)

e. $\frac{3}{6}$ ______ $\frac{2}{4}$ (=)

f. $\frac{3}{10}$ ______ $\frac{1}{3}$ (<)

g. $\frac{5}{6}$ ______ $\frac{4}{5}$ (>)

h. $\frac{2}{3}$ ______ $\frac{6}{9}$ (=)

i. $\frac{4}{7}$ ______ $\frac{2}{5}$ (>)

j. $\frac{2}{9}$ ______ $\frac{1}{3}$ (<)

SUGGESTED TEST ITEMS FOR TOPIC 8

NAME: ____________________________

1) Find a common multiple for each of the following pairs of numbers:

a) 3,4 _____
b) 5,3 _____
c) 2,7 _____
d) 10,15 _____

2) Find the least common denominator for each pair of fractions:

a) $\frac{2}{3}$, $\frac{1}{8}$ _____

b) $\frac{3}{4}$, $\frac{1}{5}$ _____

c) $\frac{1}{2}$, $\frac{3}{7}$ _____

d) $\frac{1}{5}$, $\frac{5}{9}$ _____

3) Change the following fractions to equivalent fractions with the least common denominator as the denominator.

a) $\frac{3}{4}$, $\frac{2}{5}$ _____

b) $\frac{1}{3}$, $\frac{2}{7}$ _____

c) $\frac{1}{2}$, $\frac{1}{6}$ _____

d) $\frac{5}{9}$, $\frac{3}{4}$ _____

4) Answer True or False for the following sentences.

a) $\frac{1}{3} < \frac{1}{2}$ _____

b) $\frac{5}{9} < \frac{3}{8}$ _____

c) $\frac{3}{4} > \frac{7}{10}$ _____

d) $\frac{3}{5} < \frac{1}{2}$ _____

5) In the space provided fill in the correct symbol of equality or inequality ($<$, $=$, $>$);

a) $\frac{3}{8}$ ______ $\frac{1}{3}$

b) $\frac{4}{5}$ ______ $\frac{5}{9}$

c) $\frac{1}{2}$ ______ $\frac{3}{7}$

d) $\frac{1}{6}$ ______ $\frac{2}{5}$

Topic Nine

THEME: To learn how to compare more than two fractions (positive numbers only) with unlike denominators.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- find the LCD for more than two fractions (positive numbers only) with unlike denominators.
- change each fraction to its equivalent so that they have the same denominator (LCD).
- order two or more fractions (positive numbers only) with unlike denominators.

ADAPTATIONS FOR LESSON 9, FM 1 pages 46-47

CHALLENGE PROBLEM:

a) Which of the following fractions has the largest value?

$\frac{2}{3}, \frac{3}{5}, \frac{4}{9}$

b) How would you put them in order from smallest to largest (least to greatest)?

DEVELOPMENT:

A) For development 1 in FM 1, pg. 46, use the following to demonstrate the solution to challenge problems a + b.

SOLUTION TO CHALLENGE PROBLEM:

1) Find the LCD by finding:

A) Multiples of 3: 3,6,9,12,15,18,21,24,27,30,33,36,39,42,45,48,51
B) Multiples of 5: 5,10,15,20,25,30,35,40,45,50,55,60
C) Multiples of 9: 9,18,27,36,45,54
D) Thus, the LCD for the three fractions is 45.

2) Change each fraction so that it is an equivalent fraction with a denominator of 45 (the LCD);

A) $\frac{2}{3} = \frac{?}{45}$ 3 x 15 = 45 so $\frac{2 \times 15}{3 \times 15} = \frac{30}{45}$ Therefore $\frac{2}{3} = \frac{30}{45}$

B) $\frac{3}{5} = \frac{?}{45}$ 5 x 9 = 45 so $\frac{3 \times 9}{5 \times 9} = \frac{27}{45}$ Therefore $\frac{3}{5} = \frac{27}{45}$

C) $\frac{4}{9} = \frac{?}{45}$ 9 x 5 = 45 so $\frac{4 \times 5}{9 \times 5} = \frac{20}{45}$ Therefore $\frac{4}{9} = \frac{20}{45}$

3) Since the three fractions now have the same denominator, compare the three numerators. Thirty is greater than twenty-seven, and twenty seven is greater than 20.

4) Thus, if $\frac{30}{45}$ is larger than $\frac{27}{45}$ and $\frac{20}{45}$, then $\frac{2}{3}$ is greater than $\frac{3}{5}$ and $\frac{4}{9}$.

B) Do application A in FM 1 p 47 (omit negative signs in questions).

C) Arrange in order from smallest to largest (least to greatest) as follows:

Since $\frac{2}{3} = \frac{30}{45}$

$\frac{3}{5} = \frac{27}{45}$

$\frac{4}{9} = \frac{20}{45}$

NOTE: Put the new (equivalent) fractions in order first.

Thus by comparing the numerators of fractions with common denominators we can determine the following order:

$\frac{20}{45}, \frac{27}{45}, \frac{30}{45}$

Now substitute original (equivalent) fraction to determine the order of original fractions. The order smallest to largest, is written as:

$\frac{4}{9}, \frac{3}{5}, \frac{2}{3}$

D) Do Application B, FM 1 pg 47 (omit negative signs.)

E) Omit Development 3, FM 1 pg 46. This concept can be omitted in that it would be more concrete to learn one method of ordering fractions. The combination of two methods might be too confusing. Also, Omit Application C, FM 1, pg 47.

F) Proceed to Summary FM 1, pg 47.

SUGGESTED TEST ITEMS FOR TOPIC 9

NAME: ______________________

1) For each of the following sets of fractions:
   a) Find the least common denominator (LCD)
   b) Change each fraction to an equivalent fraction with the LCD.
   c) Arrange each set in order from least to greatest.

GROUP A) $\frac{3}{4}, \frac{1}{2}, \frac{5}{8}$ a) LCD = _____

b) Equivalent fractions: $\frac{3}{4}$ = _____ $\frac{1}{2}$ = _____ $\frac{5}{8}$ = _____

c) Order from least to greatest: _____ _____ _____

GROUP B) $\frac{3}{5}, \frac{1}{8}, \frac{7}{10}$ a) LCD = _____

b) Equivalent fractions: _____ _____ _____

c) Order from least to greatest: _____

GROUP C) $\frac{2}{3}, \frac{3}{4}, \frac{5}{6}$ a) LCD = _____

b) Equivalent fractions: _____ _____ _____

c) Order from least to greatest: _____ _____ _____

Topic Ten

THEME: To learn how to add signed numbers using the number line.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state that a positive number can be represented by a move to the right, and a negative number can be represented by a move to the left, on the number line.
- add two, or more whole numbers on the number line.
- add positive and negative numbers on the number line (sums may be either positive or negative.)

VOCABULARY ADAPTATIONS:

Review: negative number, positive number
Delete: commutative property

ADAPTATIONS FOR LESSON 10, FM 1, pgs. 48-50

ADAPTED CHALLENGE PROBLEM:

A. Use the problem in FM 1, pg. 48.

B. Additional problem: The temperature at 10 a.m. was 3° below zero. During the next two hours the temperature went down 2°. What was the temperature at twelve noon?"

C. At 1 p.m. the temperature was 6° above zero. During the next three hours the temperature dropped (went down) 8°. What was the temperature at 4 p.m.?

D. At 2 p.m. the temperature was 4° below zero. During the next hour the temperature went up 5°. What was the temperature at 3 p.m.?

DEVELOPMENT:

A. Do Development 1 and 2 in FM 1, pg. 48. Omit the section on the commutative property of addition on the bottom of pg. 48.

B. Use a number line, as in Development 2, to illustrate the answers to the Adapted Challenge Problems B, C and D.

C. Do application A and B in FM 1, pg. 49.

D. Do Adapted Application #1.

E. Proceed to Development #'s 4 and 5 FM 1 pg. 49.

F. Do Adapted Application #2.

SUMMARY:

A. Use summary 1 and 2 on FM 1 pg. 50.

B. Add to summary

- a) "What kind of number appears to be the sum of two positive numbers?" answer: positive.
- b) "What kind of number appears to be the sum of two negative numbers?" answer: negative.
- c) "What kind of number could we get when we add a positive and a negative number?" answer: positive or negative.

OMIT CLIFF HANGER

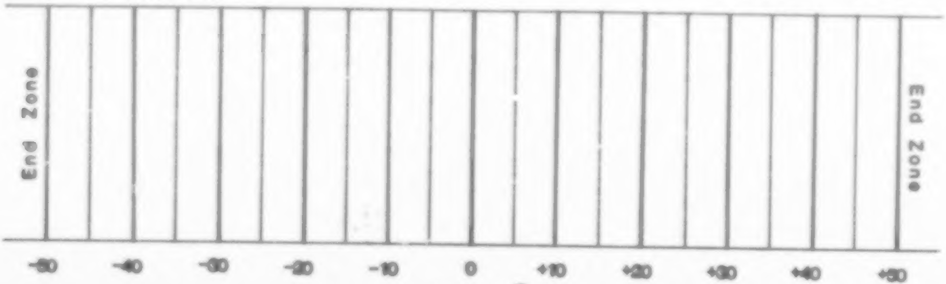
NOTE: After the development of this lesson the teacher should display a number line consisting of negative numbers, zero, and positive numbers as a visual aid for the students.

ADAPTED APPLICATIONS:

1) Make a number line to picture each sum. Write the sum of each number phrase.

		Answers			Answers
a)	(+3) + (+5)	8	a)	(-6) + (+2)	-4
b)	(-4) + (-2)	-6	f)	(-6) + (-2)	-8
c)	(-7) + (-1)	-8	g)	(-5) + (5)	0
d)	3 + 2	5			

2) Suppose the NFL changed the numbering on a football field so that the middle of the field was labeled ZERO. How would the rest of the yard markers be numbered?



Using the diagram of the football field above, to represent a number line, solve the problems.

The New York Jets start a series of four plays on the +5 yard line. Keeping in mind that a positive movement is to the right, and that a negative movement is to the left, where do the N.Y. Jets end up after the following 4 plays?

PLAY #1 - Freeman MacNeil gains 10 yards on a running play

PLAY #2 - Richard Todd completes a pass to Wesley Walker for a gain of 25 yards

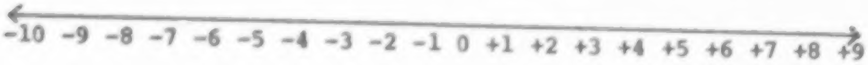
PLAY #3 - Bruce Harper loses 5 yards on a screen pass.

PLAY #4 - Jerome Barkum catches a pass for a gain of 15 yards. What is the result of these 4 plays? (answer: +50 yard line-touch down)

SUGGESTED TEST ITEMS FOR TOPIC 10

NAME: ______________________________

1) DIRECTIONS: All questions on this test will be based on work that should be performed with the use of the number line below:



Using the number line

A) Find the sums of the following signed numbers.

1) (+3) + (+2) = ______

2) (-6) + (-1) = ______

3) (0) + (+4) = ______

4) (0) + (-4) = ______

5) (-5) + (+4) = ______

6) 7 + (-3) = ______

7) -5 + 8 = ______

8) 9 + (-8) = ______

9) -6 + 3 = ______

10) 7 + (-4) = ______

11) (-2) + (-3) + (-1) = ______

12) (-7) + (+3) + (-4) = ______

B. Find the sums of the following signed numbers.

1) $\begin{array}{r} +8 \\ \underline{-7} \end{array}$ 2) $\begin{array}{r} +5 \\ \underline{+3} \end{array}$ 3) $\begin{array}{r} -2 \\ \underline{-6} \end{array}$ 4) $\begin{array}{r} -8 \\ \underline{0} \end{array}$ 5) $\begin{array}{r} +5 \\ \underline{-10} \end{array}$ 6) $\begin{array}{r} -7 \\ \underline{+7} \end{array}$ 7) $\begin{array}{r} +5 \\ \underline{-3} \end{array}$ 8) $\begin{array}{r} +9 \\ \underline{0} \end{array}$

Topic Eleven

THEME: To learn how to develop rules for the addition of signed numbers.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define absolute value of a number as its distance from zero on a number line.
- state the rules for adding signed numbers
- apply the rules for adding signed numbers

ADAPTED VOCABULARY:

Additional new term: opposite
Delete: additive inverse
Review: unlike signs

ADAPTATIONS FOR LESSON 11, FM 1 pgs 51-53

CHALLENGE PROBLEM:

a) Do cliff hanger from FM 1, pg 50.

b) Do challenge problem in FM 1, pg 51.

DEVELOPMENT:

A. Do development 1 and 2, FM 1, pg. 51.

B. In development 2 omit the symbol for absolute value. Focus on concept, rather than notation.

C. List following rules on chalkboard for adding signed numbers.

RULES:

1. When adding two or more positive numbers the answer will always be positive.

   NOTE: If a number does not have a sign it is always positive.

2. When adding two or more negative numbers the answer will always be negative.

3. When adding two numbers with unlike signs the answer can be positive or negative. The answer can be obtained by finding the difference between the two numbers and using the sign that is in front of the "bigger" number symbol (Number with larger absolute value).

   $(+7) + (-1) = (+6)$
   $(-9) + (+4) = (-5)$

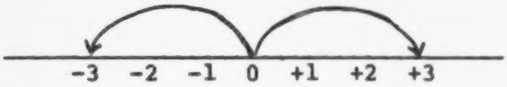
NOTE: It is important that the students are aware that the use of parentheses in these problems are only to separate the positive or negative sign of the number from the operational symbol.

i.e.: -4 + (-6) = 10

D. Addition of opposite signed numbers: (NOTE: the term additive inverse has been omitted. The concept should be taught as opposite signed numbers.

Illustrate, with the use of a number line, that the opposite of any number is the same amount of spaces on the opposite, or other, side of zero.

i.e.



+3 is three spaces to the right from 0, and -3 is also three spaces from 0, but on the other side (to the left) of 0. -3 is the opposite signed number of +3.

Elicit the rule that when you add opposite signed numbers the result will always be zero. (0).

a) +7 + (-7) = 0
b) 13 + (-13) = 0
c) -5 + (+5) = 0
d) (-2) + +2 = 0

E. Omit application A, FM 1 pg. 52.

F. Do application B + C, FM 1 pgs. 52-53.

G. Do adapted application #'s 1 and 2.

H. Do summary, FM 1 pg. 53.

NOTE: Change the term additive inverse to opposite signed number, in summary #2-4.

VISUAL TEACHING TECHNIQUE - To assist in the addition of positive and negative numbers.

EXAMPLES: What is the sum of +5 and -3?

A) Since +5 is positive we can show them as 5p's-ppppp. To make it simpler we may show them just by the top of the P:)))))

B) Since -3 is negative, on the opposite side of zero, they can be shown with the opposite symbol:CCC.

C) Now add the symbols together))))) [)+C = C+) = 0]
+CCC
000))

answer: 3 zero's 0 and 2))'s, thus 2 positives, or +2.

ADAPTED APPLICATIONS:

1. Find the sum for each of the following:

		Answers			Answers
a)	(+6) + (+7)	(13)	i)	(-2) + 19	(17)
b)	+8 + 9	(17)	j)	41 + (-26)	(15)
c)	12 + 3	(15)	k)	-8 + 14	(6)
d)	28 + 33	(61)	l)	7 + -19	(-12)
e)	(-2) + (-13)	(-15)	m)	12 + (-32)	(-20)
f)	(-18) + (-10)	(-28)	n)	-6 + 0	(-6)
g)	-20 + (-15)	(-35)	o)	(+12) + (-12)	(0)
h)	(17) + (-6)	(11)	p)	0 + 19	(19)

2. Solve each of the following problems using addition of signed numbers.

   a) Mary grew 3 inches one year and 2 inches the next year. Find the increase in her height for the two years.

   b) The temperature fell 8 degrees on Monday and continued to fall 7 degrees on Tuesday. What was the drop in temperature for the two days?

   c) Denise went on a diet. The first week she lost 6 pounds. The second week she gained 4 pounds. Find her total gain or loss for her two weeks of dieting.

   d) Tyrone has a balance of $196 in his checking account. He wrote a check for $237. What will his new balance be? (NOTE: discuss the meaning of having a negative balance in a checking account).

SUGGESTED TEST ITEMS FOR TOPIC 11

NAME: ______________________________

1) Find the sums of the following groups of signed numbers, using the rules for the addition of signed numbers:

a) (+8) + (+9) = ______

b) (+7) + (+6) = ______

c) 11 + 4 = ______

d) (-15) + (-11) = ______

e) -32 + (-14) = ______

f) (18) + (-12) = ______

g) (-52) + (+38) = ______

h) (-112) + (+47) + (+30) = ______

i) (-8) + (-11) = ______

j) (-9) + (+9) = ______

2) Solve each of the following problems, using the rules for the addition of signed numbers:

a) A football team gained 12 yards, and then lost 15 yards on the next play. What was the result of the two plays? _____

b) The temperature fell 10 degrees on Thursday, and continued to fall 12 degrees on Friday. What was the drop in temperature for the two days? _____

c) Amy gained 5 pounds in one year, and gained 7 pounds the next year. Find the total increase in her weight for the two years. _____

d) The temperature at 6 a.m. was 5° below zero. It rose 10° by 2 p.m. What was the temperature at 2 p.m.? _____

Topic Twelve

THEME: To learn how to add fractions and mixed numbers with like denominators.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- add fractions with like denominators.
- add mixed numbers with like denominators.

VOCABULARY ADAPTATIONS:

Delete: unlike denominators, reduce, signed numbers.
Additional Review Terms: improper fraction, common denominator.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

A. Refer to development 1 in FM 1 p. 54. Stop after eliciting the rule for adding fractions with like denominators.

Develop the following rules:

1. Keep the common denominator.
2. Add the numerators.
3. Use the rules for adding signed numbers.

B. Do application A, 1-4 only, FM 1, p. 55 and Adapted Application 1.

C. Review the meaning of proper fractions, improper fractions, and mixed numbers, how to change a mixed number to an improper fraction and improper fraction to a mixed number.

D. Introduce the addition of mixed numbers i. e., $3\frac{1}{4} + 2\frac{1}{4}$.

SOLUTION:

1. Write each mixed numbers as an improper fraction.

$$\begin{array}{l} 3\frac{1}{4} = \frac{13}{4} \\ 2\frac{1}{4} = \frac{9}{4} \\ \hline \frac{22}{4} = 5\frac{2}{4} \end{array}$$

2) Keep the common denominator and add the numerators, using the rules for adding signed numbers.

3) Change the answer to a mixed number when necessary.

Answer: $5\frac{2}{4}$ (reducing fraction not necessary)

E. Do application A 5 -7 in FM 1, p. 55 and Adapted Application #2.

SUMMARY: Do summary in FM 1 p. 55, omit #2.

APPLICATIONS:

1. Using the rules for adding fractions with like, or common denominators, solve the following problems:

	Answers
a) $+\frac{1}{5} + +\frac{3}{5} =$	$(+\frac{4}{5})$
b) $-\frac{4}{9} + -\frac{2}{9} =$	$(-\frac{6}{9})$
c) $+\frac{2}{6} + \frac{4}{6} =$	$(+\frac{6}{6}$ or $1)$
d) $-\frac{3}{7} + -\frac{3}{7} =$	$(-\frac{6}{7})$
e) $\frac{+3}{11} + \frac{6}{11} + \frac{4}{11} =$	$(+\frac{13}{11}$ or $+1\ \frac{2}{11})$
f) $\frac{-2}{13} + (\frac{-6}{13}) + (\frac{-3}{13}) + (\frac{1}{13}) =$	$(-\frac{12}{13})$

2. Using the rules for adding mixed numbers with like, or common denominators, solve the following problems. Express your answers in the form of a mixed number.

	Answers
a) $(+3\frac{2}{7}) + (+6\frac{4}{7}) =$	$(+9\frac{6}{7})$
b) $(-5\frac{1}{4}) + (-7\frac{2}{4}) =$	$(-12\frac{3}{4})$
c) $(+11\frac{3}{10}) + (+4\frac{6}{10}) =$	$(+15\frac{9}{10})$
d) $(-8\frac{2}{9}) + (-2\frac{5}{9}) =$	$(-10\frac{7}{9})$
e) $(+6\frac{2}{3}) + (+3\frac{2}{3}) =$	$(+10\frac{1}{3})$
f) $(-7\frac{5}{6}) + (-9\frac{1}{6}) =$	(-17)
g) $(+2\frac{3}{5}) + (+6\frac{1}{5}) + (+1\frac{4}{5})$	$(+10\frac{3}{5})$
h) $(-11\frac{3}{8}) + (-7\frac{5}{8}) + (-2\frac{7}{8})$	$(-21\frac{7}{8})$

SUGGESTED TEST ITEMS FOR TOPIC 12, THEME #1

NAME: ______________________________

1) Find the sums of the following groups of fractions and mixed numbers. Express the answer as a mixed number or proper fraction:

a) $\left(+\frac{1}{6}\right) + \left(+\frac{2}{6}\right) =$ ______

b) $\left(+\frac{2}{5}\right) + \left(+\frac{3}{5}\right) =$ ______

c) $\left(-\frac{5}{9}\right) + \left(-\frac{3}{9}\right) =$ ______

d) $\left(-\frac{1}{3}\right) + \left(-\frac{1}{3}\right) =$ ______

e) $\left(+\frac{22}{10}\right) + \left(+\frac{12}{10}\right) =$ ______

f) $\left(\frac{-3}{15}\right) + \left(\frac{-8}{15}\right) =$ ______

g) $\left(+\frac{5}{7}\right) + \left(+\frac{4}{7}\right) =$ ______

h) $\left(\frac{+2}{11}\right) + \left(\frac{+7}{11}\right) + \left(\frac{+5}{11}\right) =$ ______

i) $\left(\frac{-2}{17}\right) + \left(\frac{-9}{17}\right) + \left(\frac{-4}{17}\right) =$ ______

j) $\left(\frac{-3}{10}\right) + \left(\frac{-5}{10}\right) + \left(\frac{-7}{10}\right) + \left(\frac{-1}{10}\right)$

k) $\left(+2\ \frac{3}{7}\right) + \left(8\ \frac{2}{7}\right) =$ ______

l) $\left(-6\ \frac{2}{4}\right) + \left(-9\ \frac{1}{4}\right) =$ ______

m) $\left(+12\ \frac{4}{10}\right) + \left(+5\ \frac{3}{10}\right) =$ ______

n) $\left(-7\frac{5}{8}\right) + \left(-3\frac{2}{8}\right) =$ ______

o) $\left(+7\ \frac{2}{3}\right) + \left(+8\ \frac{2}{3}\right) =$ ______

p) $\left(-8\ \frac{1}{6}\right) + \left(-8\ \frac{5}{6}\right) =$ ______

q) $\left(-2\ \frac{1}{2}\right) + \left(-1\ \frac{1}{2}\right) =$ ______

r) $\left(-3\ \frac{1}{4}\right) + \left(-5\ \frac{1}{4}\right) =$ ______

s) $\left(+3\ \frac{4}{5}\right) + \left(+7\ \frac{3}{5}\right) + \left(2\ \frac{1}{5}\right) =$ ______

t) $\left(-10\ \frac{7}{8}\right) + \left(-8\ \frac{3}{8}\right) + \left(-3\ \frac{5}{8}\right) =$ ______

Topic Twelve

THEME 2: To learn how to add fractions and mixed numbers with unlike denominators (like signs only)

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- add fractions with unlike denominators (like signs only).
- add mixed numbers with unlike denominators (like signs only).

VOCABULARY ADAPTATIONS:

Additional Review Terms: Unlike denominators, equivalent fractions, least common denominator (LCD), improper fractions, mixed numbers.

ADAPTATIONS FOR LESSON 12 FM 1, p 54-57, Part 2

CHALLENGE PROBLEM: Henry ran $\frac{1}{4}$ of a mile in the morning and $\frac{2}{3}$ of a mile in the afternoon. How far did he run all together?

DEVELOPMENT:

A. Discuss challenge problem. Elicit the fact that to find the answer we must add the two fractions.

B. Have students recall that one of the earlier topics was comparing and ordering fractions with unlike denominators. In doing that we had to find the least common denominator. Explain that to add fractions the denominators must also be the same.

C. Solve the challenge problem as follows:
Find the sum of $\frac{1}{4}$ and $\frac{2}{3}$.

SOLUTION:

1) Find the multiples of each denominator.
Multiples of 4: 4, 8, 12, 16, 20, 24
Multiples of 3: 3, 6, 9, 12, 15, 18, 21, 24

2) Find the least common denominator (LCD).
LCD = 12

3) Change each fraction into an equivalent fraction with the LCD (12) as its denominator.

$$\frac{1}{4} = \frac{1}{4} \cdot \frac{3}{3} = \frac{3}{12}$$

$$\frac{2}{3} = \frac{2}{3} \cdot \frac{4}{4} = \frac{8}{12}$$

4) Add the numerators using the rules for adding signed numbers. Keep the common denominator.

$\frac{3}{12} + \frac{8}{12} = \frac{3 + 8}{12} = \frac{11}{12}$

D) Do Application B, Questions 1-4, FM 1, pg. 55, and Adapted Application #1.

E) Review the concepts of changing mixed numbers into improper fractions. Illustrate the method on the chalkboard.

A) $2\frac{1}{3} = \frac{(2 \times 3) + 1}{3} = \frac{6 + 1}{3} = \frac{7}{3}$

B) $1\frac{4}{9} = \frac{(9 \times 1) + 4}{9} = \frac{9 + 4}{9} = \frac{13}{9}$

F) When adding mixed numbers, with unlike denominators, the following method should be used:

Find the sum of $(+6\frac{3}{7}) + (+3\frac{2}{3})$

SOLUTION:

1) Write each mixed number as an improper fraction.

$+6\frac{3}{7} = \frac{(6.7) + 3}{7} = \frac{45}{7}$

$+3\frac{2}{3} = \frac{(3.3) + 2}{3} = \frac{11}{3}$

2) Find the multiples of each denominator.

Multiples of 7 = 7, 14, 21, 28, 35.

Multiples of 3 = 3, 6, 9, 12, 15, 18, 21, 24.

3) Find the least common denominator (LCD) for the unlike denominators.
LCD = 21

4) Change each improper fraction into an equivalent fraction with a denominator of 21 (the LCD)

$$\frac{45}{7} = \frac{45\cdot 3}{7\cdot 3} = +\frac{135}{21}$$

$$+\frac{11}{3} = \frac{11\cdot 7}{3\cdot 7} = +\frac{77}{21}$$

5) Keep the common denominator, and add the numerators, using the rules for adding signed numbers.

$$\begin{array}{r} \frac{135}{21} \\ +\frac{77}{21} \\ \hline \frac{212}{21} \end{array}$$

6) Change the improper fraction into a mixed number.

$$+\frac{212}{21} = 212 \div 21 = 10\ \frac{2}{21}$$

7) Write the answer

$$(+6\ \frac{3}{7}) + (3\ \frac{2}{3}) = +10\ \frac{2}{21}$$

G) Do application B, 5 and 6, in FM 1, pg 55, and Adapted Applications 2 and 3.

SUMMARY: Do the homework problem in FM 1, pgs. 56-57. Review all rules for adding, whole numbers, fractions, and mixed numbers with like signs, with like and unlike denominators.

NOTE: This classwork activity is a culmination of Topics 10,11, and 12 in Unit 2. This activity should be used as a review lesson, as well as a means of measuring the attainment of the performance objectives for these three topics. This exercise will probably take one class period.

$$(\frac{-3}{6}) + (\frac{1}{16})$$

N.B. CORRECTION: Problem #23 page 57, FM 1 should read: $(\frac{-3}{6}) + (\frac{1}{16})$ the result is $\frac{-21}{48}$.

APPLICATIONS:

1) Using the rules for adding fractions with like signs and unlike denominators, find the following sums.

		Answers
a)	$(\frac{2}{5}) + (+\frac{1}{3}) =$	$+\frac{11}{15}$
b)	$(-\frac{3}{8}) + (-\frac{2}{6}) =$	$-\frac{17}{24}$
c)	$(+\frac{4}{9}) + (+\frac{3}{4}) =$	$+\frac{43}{36}$
d)	$(-\frac{2}{7}) + (-\frac{2}{3}) =$	$-\frac{20}{21}$
e)	$(\frac{1}{2}) + (+\frac{4}{11}) =$	$+\frac{19}{22}$
f)	$(-\frac{3}{10}) + (-\frac{5}{12}) =$	$+\frac{43}{60}$

2) Using the rules for adding mixed numbers with like signs and unlike denominators, solve the following problems. Express all answers as mixed numbers.

		Answers
a)	$(+2\ \frac{1}{5}) + (+4\ \frac{3}{4}) =$	$(+6\ \frac{19}{20})$
b)	$(-1\ \frac{1}{3}) + (-3\ \frac{3}{6}) =$	$(-4\ \frac{5}{6})$
c)	$(+7\ \frac{2}{9}) + (+5\ \frac{1}{2}) =$	$(+12\ \frac{13}{18})$
d)	$(-6\ \frac{3}{8}) + (-9\ \frac{1}{10}) =$	$(-15\ \frac{19}{40})$
e)	$(+3\ \frac{5}{6}) + (+4\ \frac{3}{5}) =$	$(+8\ \frac{13}{30})$
f)	$(-2\ \frac{2}{3}) + (-7\ \frac{3}{4}) =$	$(-10\ \frac{5}{12})$
g)	$(+1\ \frac{2}{5}) + (+3\ \frac{1}{2}) + (5\ \frac{2}{3}) =$	$(+10\ \frac{17}{30})$
h)	$(-4\ \frac{3}{4}) + (-2\ \frac{2}{5}) + (-1\ \frac{1}{2}) =$	$(-8\ \frac{13}{20})$

SUGGESTED TEST ITEMS FOR TOPIC 12 THEME #2

NAME: ____________________

1. Find the sums of the following groups of fractions and mixed numbers. Express your answers as mixed numbers or proper fractions:

a) $(+\frac{1}{5}) + (+\frac{2}{3})$ = __________

b) $(-\frac{1}{8}) + (\frac{13}{6})$ = __________

c) $(+\frac{5}{9}) + (+\frac{3}{4})$ = __________

d) $(-\frac{4}{7}) + (-\frac{2}{3})$ = __________

e) $(\frac{+7}{11}) + (\frac{+1}{2})$ = __________

f) $(2\ \frac{2}{5}) + (-4\ \frac{1}{3})$ = __________

g) $(-2\ \frac{2}{6}) + (-4\ \frac{1}{3})$ = __________

h) $(+8\ \frac{1}{9}) + (+5\ \frac{1}{2})$ = __________

i) $(3\ \frac{5}{6}) + (8\ \frac{4}{5})$ = __________

j) $(-4\ \frac{3}{4}) + (-7\ \frac{2}{3})$ = __________

3) Solve the following problems:

a. Maria weighed $124\frac{3}{4}$ pounds. She gained $3\frac{1}{2}$ pounds in a week.

How much did she weigh at the end of the week?

b. Dave traveled $8\frac{3}{8}$ hours one day and $7\frac{5}{8}$ hours the next day.

How many hours did he travel both days?

c. The temperatures dropped $3\frac{1}{4}$ degrees in the morning and $4\frac{1}{2}$ degrees in the afternoon.

How many degrees did the temperature drop all together?

d. Annie used $2\frac{1}{3}$ yards of material for a dress and $5\frac{1}{2}$ yards of material for a coat from a bolt of cloth.

How many yards of material did she use for both things?

Topic Thirteen

THEME 1: To learn how to add fractions and mixed numbers with like denominators and unlike signs.

NOTE: Throughout this topic all subtractions involving whole or mixed numbers will be performed by changing them to improper fractions. Exchange or regrouping is avoided. It is suggested that the teacher use this approach.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- express the addition of fractions and mixed numbers with like denominators and unlike signs on a number line.
- state the rules for adding fractions and mixed numbers with like denominators and unlike signs.
- add fractions and mixed numbers with like denominators and unlike signs without the use of a number line.

VOCABULARY ADAPTATIONS:

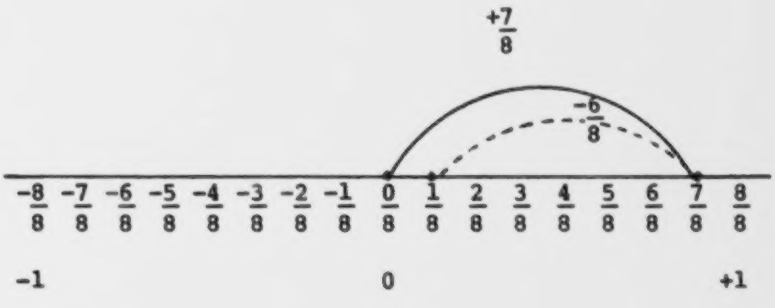
Additional Reviews Terms: like denominators, unlike signs. Omit new and review terms in FM 1, pg 58

ADAPTATIONS FOR LESSON 13, pages FM 1, pgs. 58-59, Part 1.

DEVELOPMENT:

A. Do development 1 in FM 1, pg. 58. State the rules for adding fractions with common denominators and unlike signs. Illustrate the rules using the answer from the challenge problem.

B. Illustrate the following number line on the chalkboard.



C. The rules for adding fractions with like denominators and unlike signs are as follows:

1. Keep the common denominator.

2. Add the numerators using the rules for adding signed numbers. When adding a positive number and a negative number, find the difference between the two numbers and use the sign that is in front of the "bigger" number symbol (number with larger absolute value).

Example:

Find the sum of $\left(\frac{7}{8}\right) + \left(\frac{-6}{8}\right)$

SOLUTION:

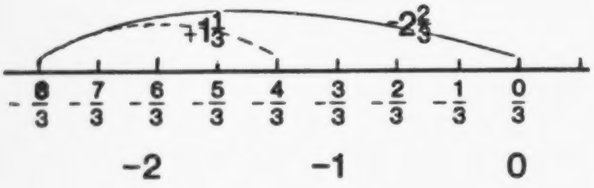
a. Keep the common denominator
b. Add the numerators using the rules for adding signed number

$$\frac{(7) + (-6)}{8} = \frac{1}{8}$$

D. Do application A in FM 1, pg. 58.

E. Illustrate the following number line on the chalkboard to answer the following questions.

What is the sum of $\left(-2\frac{2}{3}\right) + \left(+1\frac{1}{3}\right)$?



$+1\frac{1}{3}$
$-2\frac{2}{3}$
$-\frac{8}{3}$ $-\frac{7}{3}$ $-\frac{6}{3}$ $-\frac{5}{3}$ $-\frac{4}{3}$ $-\frac{3}{3}$ $-\frac{2}{3}$ $-\frac{1}{3}$ $\frac{0}{3}$
-2
-1
0

Thus the sum of $\left(-2\frac{2}{3}\right) + \left(+1\frac{1}{3}\right) = \frac{-4}{3}$ or $-1\frac{1}{3}$

F. The rules for adding mixed numbers with like denominators and unlike signs can be illustrated as follows:

Find the sum of $\left(-2\frac{2}{3}\right) + \left(1\frac{1}{3}\right)$

1. Write each mixed number as improper fraction

$$-2\frac{2}{3} = \frac{(3.2)}{3} + 2 = \frac{-8}{3}$$

$+1\frac{1}{3} = \frac{(3.1) + 1}{3} = +\frac{4}{3}$

2. Keep the common denominator. (Common Den. = 3)

3. Add the numerators using the rules for adding signed numbers.

   $(-8) + (+4) = -4$

4. Answer: $-\frac{4}{3}$ or $-1\frac{1}{3}$

G. Do application below

ADAPTED SUMMARY:

1. Review the rules for adding signed numbers.
2. Review the rules for finding the least common denominator.
3. Review the rules for changng mixed numbers into improper fractions, and changing improper fractions into mixed numbers.

APPLICATION: Find the sums of the following:

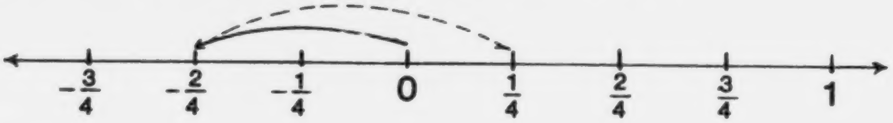
		Answers
a)	$(8\frac{5}{11}) + (-4\frac{3}{11})$	$[+4\frac{2}{11}]$
b)	$(-7\frac{2}{3}) + (+3\frac{1}{3})$	$[-4\frac{1}{3}]$
c)	$(-2\frac{3}{5}) + (+1\frac{1}{5})$	$[-1\frac{2}{5}]$
d)	$(-9\frac{7}{10}) + (3\frac{5}{10})$	$[-6\frac{2}{10}]$
e)	$(-1\frac{1}{8}) + (5\frac{2}{8})$	$[4\frac{1}{8}]$
f)	$(+5) + (-8\frac{5}{12})$	$[-3\frac{5}{12}]$

SUGGESTED TEST ITEMS FOR TOPIC 13, THEME 1

Name ________________________________

1) Each number line shows the addition of two fractions. Fill in the blanks to represent the fractions being added and the sums.

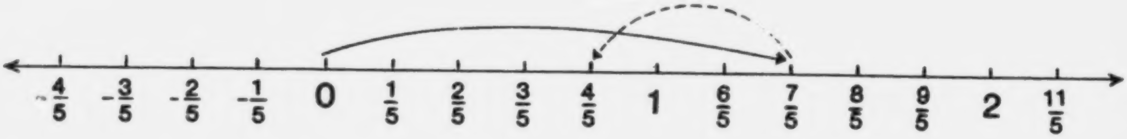
a)



$-\frac{3}{4}$
$-\frac{2}{4}$
$-\frac{1}{4}$
0
$\frac{1}{4}$
$\frac{2}{4}$
$\frac{3}{4}$
1

_____ + _____ = _____

b)



$-\frac{4}{5}$
$-\frac{3}{5}$
$-\frac{2}{5}$
$-\frac{1}{5}$
0
$\frac{1}{5}$
$\frac{2}{5}$
$\frac{3}{5}$
$\frac{4}{5}$
1
$\frac{6}{5}$
$\frac{7}{5}$
$\frac{8}{5}$
$\frac{9}{5}$
2
$\frac{11}{5}$

_____ + _____ = _____

2. Find the sums of the following. Express all answers as proper fractions or mixed numbers.

a) $\left(\frac{7}{12}\right) + \left(\frac{-5}{12}\right) =$

b) $\left(\frac{-12}{13}\right) + \left(\frac{+2}{13}\right)$

c) $\left(\frac{-3}{7}\right) + \left(\frac{+16}{7}\right) =$

d) $\left(\frac{+4}{17}\right) + \left(\frac{-17}{17}\right) =$

e) $\left(+2\ \frac{3}{4}\right) + \left(-1\ \frac{1}{4}\right) =$

f) $\left(-4\ \frac{4}{5}\right) + \left(+2\ \frac{3}{4}\right) =$

g) $\left(-1\ \frac{1}{3}\right) + \left(4\ \frac{2}{3}\right) =$

h) $\left(2\ \frac{3}{7}\right) + \left(-3\ \frac{5}{7}\right) =$

Topic Thirteen

THEME 2: To learn how to add fractions and mixed numbers with unlike denominators and unlike signs.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state the rules for adding fractions and mixed numbers with unlike denominators and unlike signs.
- add fractions and mixed numbers with unlike denominators and unlike signs.

ADAPTED VOCABULARY:

Additional Review Terms: unlike denominators, least common denominator (LCD)

ADAPTATIONS FOR LESSON 13 FM 1, pgs 58-59, part 2

DEVELOPMENT:

A. Do development 3 in FM 1, pg. 58. Elicit from the students the need to find a common denominator for the two fractions before any work can be done to solve the problem.

After this has been done we begin to consider the problem. After finding the common denominator, it is necessary to change each fraction to an equivalent fraction with a common denominator. Then, apply the rules for adding fractions.

B. Use the problem posed in Development 3, to illustrate the rules for adding fractions with unlike denominators and unlike signs on the chalkboard.

e.g. Find the sum of $(+\frac{3}{4}) + (-\frac{1}{5})$

1. Find the multiples of the unlike denominators 4 and 5.

   Multiples of 4 ÷ 4,8,12,16,20,24

   Multiples of 5 ÷ 5,10,15,20,25,30

2. Find the least common denominator from the multiples of the unlike denominators.

   LCD = 20

3. Change the two fractions into equivalent fractions with the denominator of the LCD (20).

$$\frac{+3}{4} = \frac{3 \times 5}{4 \times 5} = \frac{+15}{20}$$

$$\frac{-1}{5} = \frac{1 \times 4}{5 \times 4} = \frac{-4}{20}$$

4. Keep the common denominator and add the numerators, use the rules for adding signed numbers.

$$\frac{(+15) + (-4)}{20} = \frac{+11}{20}$$

5. Answer

$$\left(\frac{+3}{4}\right) + \left(\frac{-1}{5}\right) = \frac{+11}{20}$$

C. Do application B in FM 1, pg. 59.

D. Introduce the following problem $(+4\frac{2}{3}) + (-2\frac{3}{5})$.

Elicit from the students that an additional step must be performed before computing the answer. Change the mixed numbers into improper fractions. Illustrate the method for solving this problem on the chalkboard.

e.g. Find the sum of $(+4\frac{2}{3} + (-2\frac{3}{5})$

1. Change each mixed number into an improper fraction.

$$+4\frac{2}{3} + \frac{(4 \times 3) + 2}{3} = \frac{14}{3}$$

$$-2\frac{3}{5} + \frac{(2 \times 5) + 3}{5} = \frac{-13}{5}$$

2. Find the multiples of the unlike denominators 3 and 5.

Multiples of 3: 3,6,9,12,15,18,21

Multiples of 5: 5,10,15,20,25,30

3. Find the least common denominator from the multiples of the unlike denominators L.C.D=15.

4. Change the two improper fractions into equivalent fractions with the denominator of the LCD (15).

$$+\frac{14}{3} = \frac{14.5}{3.5} = +\frac{70}{15}$$

$$-\frac{13}{5} = \frac{13.3}{5.3} + -\frac{39}{15}$$

5. Keep the common denominator, and add the numerators. Use the rules for adding signed numbers.

$$\frac{(+70)\ +\ (-39)}{15} = +\frac{31}{15}$$

6. Review: Changing improper fractions into mixed numbers:

$$\frac{31}{15} = 31 \div 15 = 2\ \frac{1}{15}$$

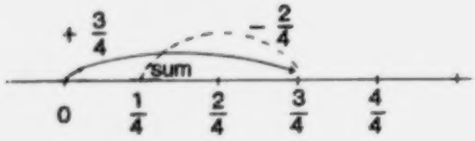
7. Answer: $(+4\ \frac{2}{3}) + (-2\ \frac{3}{5}) = +\frac{31}{15}$ or $+\ 2\ \frac{1}{15}$

E. DO ADAPTED APPLICATION #1.

F. Omit summary in FM 1, pg. 59. Use the adapted Summary.

SUMMARY:

A. Have the students look at the following diagram:



Ask the following questions:

1. What does the word sum tell us?"

2. "What fractions did we add?"

Elicit $(+\frac{3}{4}) + (-\frac{2}{4}) = +\frac{1}{4}$

3. Demonstrate the "sum" vertically $\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$ and pose the question:

   "If a student came into class right now, and we asked him, or her, what type of math problem we were doing what might he, or she say?"

   Try to elicit the idea of subtraction.

4. "Could we re-write the problem to get the same answer?"

   Try to elicit Yes, that $\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$

B. Review the rules for adding signed numbers for a positive and negative number. "When adding one positive and one negative number, find the difference between the two, (emphasize difference), and use the sign of the number with the greater absolute value."

C. Ask the following: "What type of operation are we really doing here?" Again, try to elicit subtraction.

D. End the theme by stating that the addition of one positive signed number and one negative signed number is the same as subtracting the two numbers. This leads to the next theme.

APPLICATION:

Find the sum for each of the following.

		Answers
a)	$-9\frac{2}{7} + 5\frac{1}{4} =$	$-4\frac{1}{28}$
b)	$-4\frac{7}{8} + \frac{7}{12} =$	$-3\frac{14}{48}$
c)	$-12\frac{1}{3} + 6\frac{1}{6} =$	$-6\frac{1}{6}$
d)	$+22\frac{2}{3} + -20\frac{1}{6} =$	$+2\frac{3}{6}$
e)	$+15\frac{9}{10} + -8\frac{3}{5} =$	$7\frac{3}{10}$

SUGGESTED TEST ITEMS FOR TOPIC 13, THEME 2

NAME: ______________________________

1. Find the LCD for each pair of fractions:

   a) $\frac{5}{6}, \frac{3}{4}$ LCD = ______

   b) $-\frac{1}{9}, \frac{5}{12}$ LCD = ______

   c) $-\frac{5}{7}, \frac{2}{3}$ LCD = ______

2. Change each pair of fractions to equivalent fractions having a common denominator.

   a) $\frac{3}{4}, -\frac{2}{5}$ ______ ______

   b) $-\frac{8}{3}, +\frac{5}{6}$ ______ ______

   c) $\frac{-5}{12}, \frac{+11}{8}$ ______ ______

3. Express each mixed number as an improper fraction whose denominator is shown.

   a) $+4\,\frac{2}{3} = \frac{\quad}{6}$

   b) $-2\,\frac{1}{7} = \frac{\quad}{21}$

   c) $+1\,\frac{5}{8} = \frac{\quad}{32}$

4. Find the sums of the following. Express all answers as proper fractions or mixed numbers.

   a) $\frac{+7}{12} + -\frac{3}{4}$

   b) $\frac{-3}{10} + \frac{+2}{15}$

   c) $-\frac{5}{6} + +\frac{3}{8}$

   d) $-\frac{2}{3} + \frac{8}{5}$

   e) $-2\,\frac{3}{4} + 1\,\frac{1}{2}$

   f) $+3\,\frac{2}{3} + -2\,\frac{1}{5}$

   g) $6\,\frac{4}{5} + -4\,\frac{1}{4}$

   h) $1\,\frac{2}{7} + -4\,\frac{2}{3}$

Topic Thirteen

THEME 3: To learn how to subtract fractions with like and unlike denominators and mixed numbers with like denominators.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- subtract fractions with like denominators.
- subtract fractions with unlike denominators.
- subtract mixed numbers with like denominators.

VOCABULARY ADAPTATIONS:

Additional Review Terms: like denominators, unlike denominators, least common denominator

ADAPTATIONS FOR LESSON 13, FM 1 pgs 58-59

CHALLENGE PROBLEM:

A. Mrs. Thompson had $\frac{7}{8}$ of a cup of flour in a jar. She used $\frac{3}{8}$ of a cup of flour for a cake. How much flour did she have left?

B. From $\frac{9}{10}$ subtract $\frac{3}{4}$

DEVELOPMENT:

A. Discuss adapted challenge problem A.

B. Elicit from the class that to solve this problem we have to subtract to get the answer.

C. Develop a number phrase from challenge problem A. $(\frac{7}{8} - \frac{3}{8})$.

D. State the rule for subtracting fractions with like denominators.

If two fractions have like denominators keep the same denominator and subtract the numerators. Therefore, the answer to the challenge problem is: $\frac{7}{8} - \frac{3}{8} = \frac{7-3}{8} = \frac{4}{8}$

E. Discuss challenge problem B. Elicit from the class that to find the value of this number phrase we must subtract. Illustrate on chalkboard as follows:

$\frac{9}{10} - \frac{3}{4}$

120

1. Review the previous lessons about the need to have a common denominator for the fractions in order to compute the value of the number phrase.

2. Compute as follows:

   a. Find the multiples of each denominator:

      Multiples of 10: 10,20,30

      Multiples of 4: 4,8,12,16,20,24.

   b. Find the least common denominator (LCD): LCD=20.

   c. Convert each fraction into an equivalent fraction with the LCD=20.

      $\frac{9 \times 2}{10 \times 2} = \frac{18}{20}$

      $\frac{3 \times 5}{4 \times 5} = \frac{15}{20}$

   d. Keep the common denominator and subtract the numerators:

      $$\begin{array}{r} \frac{18}{20} \\ -\frac{15}{20} \\ \hline \frac{3}{20} \end{array}$$

F. DO APPLICATION #2

G. Pose the following question:

"Hector jogged $3\frac{3}{4}$ miles on Monday, and $2\frac{1}{4}$ miles on Tuesday.

How much further did he jog on Monday than he did on Tuesday?"

Elicit from the class that there is a need to subtract $2\frac{1}{4}$ from $3\frac{3}{4}$ to compute the answer.

Demonstrate the method of subtracting mixed numbers on the chalkboard.

i.e. Find the difference between $3\frac{3}{4}$ and $2\frac{1}{4}$.

1. Change each mixed number into an improper fraction

$$3\frac{3}{4} = \frac{(3 \times 4) + 3}{4} = \frac{12 + 3}{4} = \frac{15}{4}$$

$$1\frac{1}{4} = \frac{(2 \times 4) + 1}{4} = \frac{8 + 1}{4} = \frac{9}{4}$$

2. Keep the common denominator, and subtract the numerators.

$$\frac{15 - 9}{4} = \frac{6}{4}$$

3. Review changing improper fractions into mixed numbers

i.e - $\frac{6}{4} = 6 \div 4 = 1\frac{2}{4}$

4. Answer $3\frac{3}{4} - 2\frac{1}{4} = \frac{6}{4}$ or $1\frac{2}{4}$

H. Do adapted application #3.

I. Do Summary.

SUMMARY: Solve the following problems:

a. Renee spent $\frac{5}{6}$ of an hour polishing the furniture and $\frac{3}{10}$ of an hour cleaning the windows. How much less time did she spend cleaning the windows than polishing the furniture?

b. Leroy studied for $\frac{3}{4}$ of an hour in the afternoon. He studied for $\frac{1}{2}$ of an hour in the evening. How much less time did he study in the evening than in the afternoon?

c. There was $\frac{5}{8}$ of a cup of milk left in a container in the refrigerator. Kim drank $\frac{1}{2}$ cup of the milk. How much milk remained in the container?

ADAPTED APPLICATIONS:

1. Use the rules for subtracting fractions with like denominators. Solve the following problems:

		Answers			Answers
a)	$\frac{4}{5} - \frac{2}{5}$	$\left(\frac{2}{5}\right)$	e)	$\frac{53}{71} - \frac{28}{71}$	$\left(\frac{25}{71}\right)$
b)	$\frac{7}{9} - \frac{3}{9}$	$\left(\frac{4}{9}\right)$	f)	$\frac{8}{17} - \frac{3}{17}$	$\left(\frac{5}{17}\right)$
c)	$\frac{3}{4} - \frac{1}{4}$	$\left(\frac{2}{4}\right)$	g)	$\frac{16}{29} - \frac{7}{29}$	$\left(\frac{9}{29}\right)$
d)	$\frac{6}{11} - \frac{2}{11}$	$\left(\frac{4}{11}\right)$	h)	$\frac{33}{111} - \frac{5}{111}$	$\left(\frac{28}{111}\right)$

2. Use the rules for subtracting fractions with unlike denominators. Solve the following problems;

		Answers			Answers
a)	$\frac{7}{9} - \frac{1}{2}$	$\left(\frac{5}{18}\right)$	e)	$\frac{7}{10} - \frac{2}{5}$	$\left(\frac{3}{10}\right)$
b)	$\frac{5}{6} - \frac{3}{4}$	$\left(\frac{1}{12}\right)$	f)	$\frac{5}{12} - \frac{2}{7}$	$\left(\frac{11}{84}\right)$
c)	$\frac{6}{8} - \frac{2}{5}$	$\left(\frac{14}{40}\right)$	g)	$\frac{7}{13} - \frac{1}{3}$	$\left(\frac{8}{39}\right)$
d)	$\frac{4}{7} - \frac{1}{3}$	$\left(\frac{5}{21}\right)$	h)	$\frac{3}{4} - \frac{2}{3}$	$\left(\frac{1}{12}\right)$

3. Use the rules for subtracting mixed numbers with like denominators. Solve the following problems:

		Answers
a)	$5\frac{4}{5} - 3\frac{2}{5}$	$\left(\frac{12}{5} \text{ or } 2\frac{2}{5}\right)$
b)	$7\frac{5}{9} - 6\frac{1}{9}$	$\left(\frac{13}{9} \text{ or } 1\frac{4}{9}\right)$
c)	$10\frac{7}{8} - 3\frac{3}{8}$	$\left(\frac{60}{8} \text{ or } 7\frac{4}{8}\right)$
d)	$9\frac{5}{6} - 7\frac{5}{6}$	$\left(\frac{12}{6} \text{ or } 2\right)$

SUGGESTED TEST ITEMS FOR TOPIC 13, THEME 3

NAME: ______________________________

Perform the following subtractions. Express all answers as proper fractions or mixed numbers.

1. $\frac{14}{17} - \frac{6}{17}$

2. $5\frac{3}{4} - 2\frac{3}{4}$

3. $\frac{5}{9} - \frac{1}{6}$

4. $$\begin{array}{r} \frac{7}{15} \\ -\ \frac{2}{5} \\ \hline \end{array}$$

5. $$\begin{array}{r} \frac{43}{53} \\ -\frac{17}{53} \\ \hline \end{array}$$

6. $$\begin{array}{r} 9\frac{7}{9} \\ -\ 3\frac{2}{9} \\ \hline \end{array}$$

7. $$\begin{array}{r} 12\frac{5}{6} \\ -\ 4\frac{4}{6} \\ \hline \end{array}$$

8. $$\begin{array}{r} 10\frac{9}{10} \\ -\ 9\frac{6}{10} \\ \hline \end{array}$$

Solve each of the following problems.

9. Michael has two boards. One board is $10\frac{2}{3}$ feet long and the other is $8\frac{1}{3}$ feet long. How much must be cut from the longer board to make both boards the same length?

10. Marsha has a spool which contains $\frac{7}{8}$ yards of ribbon. If she uses $\frac{5}{12}$ yards of ribbon, how much is left on the spool?

Topic Thirteen

THEME 4: To learn how to subtract mixed numbers from whole numbers, and mixed numbers from mixed numbers with unlike denominators.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- change a whole number into an improper fraction.
- subtract a fraction from a whole number.
- subtract a mixed number from a whole number.
- subtract two mixed numbers with unlike denominators.

VOCABULARY ADAPTATIONS:

Additional Review terms: whole numbers, unlike denominator, improper fraction, mixed number, least common denominator.

ADAPTATIONS FOR LESSON 13 FM 1, pgs 58-59 part 4

ADAPTED CHALLENGE PROBLEM:

A. There were 5 pounds of flour in a jar. Mona used $\frac{1}{4}$ pound for making cookies. How much flour remained in the jar?

B. Michael's school day is 6 hours long. The morning session is $3\frac{1}{2}$ hours. How many hours are left in the afternoon?

C. Mr. Green jogged $3\frac{5}{8}$ miles on Saturday. He jogged $5\frac{1}{6}$ miles on Sunday. How many more miles did he jog on Sunday than on Saturday?

DEVELOPMENT:

A. Discuss challenge problem A. Elicit from students that in order to be able to solve the problem, we must subtract the fraction from the whole number as follows:

$$5 - \frac{1}{4}$$

B. Explain that since 5 is a whole number we cannot subtract $\frac{1}{4}$ from 5 in that form. The method for performing this subtraction is to express 5 as a fraction, thus $5 = \frac{5}{1}$. Emphasize that whole numbers can be expressed as fractions with a denominator of 1.

C. Express $5 - \frac{1}{4}$ as $\frac{5}{1} - \frac{1}{4}$

D. Solve the problem:

1. Change $\frac{5}{1}$ to an equivalent fraction with a denominator of 4

   $\frac{5 . 4}{1 . 4} = \frac{20}{4}$

2. Subtract the numerators.

   $\frac{20}{4} - \frac{1}{4} = \frac{19}{4}$

3. Change the result to mixed numbers.

   $\frac{19}{4} = 4\frac{3}{4}$

E. Do adapted application #1.

F. Discuss challenge problem B. Elicit from students that in order to solve the problem we must subtract the mixed number from the whole number as follows:

$$6 - 3\frac{1}{2}$$

G. Review that $6 = \frac{6}{1}$ since all whole numbers can be expressed as improper fractions with a denominator of 1.

H. Express $6 - 3\frac{1}{2}$ as $\frac{6}{1} - 3\frac{1}{2}$

I. Solve the problem:

1. Write each fraction as an improper fraction.

   $6 = \frac{6}{1}$

   $3\frac{1}{2} = \frac{7}{2}$

2. Change $\frac{6}{1}$ to an equivalent fraction with a denominator of 2

   $\frac{6.2}{1.2} = \frac{12}{2}$

3. Subtract the numerators

$$\begin{array}{r} \frac{12}{2} \\ -\ \frac{7}{2} \\ \hline \frac{5}{2} \end{array}$$

4. Change the result to a mixed number

$\frac{5}{2} = 2\frac{1}{2}$

5. Answer:

$6 - 3\frac{1}{2} = \frac{5}{2}$ or $2\frac{1}{2}$

J. Do adapted application #2.

K. Discuss challenge problem C. Elicit from students that to solve the problem, we must subtract the smaller mixed number from the larger mixed number as follows:

$5\frac{1}{6} - 3\frac{5}{8}$

L. Solution of the Problem:

1. Write each mixed number as an improper fraction

$5\frac{1}{6} = 3\frac{1}{6}$

$3\frac{5}{8} = \frac{29}{8}$

2. Find the multiples of each denominator:

Multiples of 6: 6,12,18,24,30
Multiples of 8: 8,16,24,32.

3. Find the LCD:

LCD = 24

4. Change each fraction into an equivalent fraction having the LCD 24 as its new denominator:

$$\frac{31 \cdot 4}{6 \cdot 4} = \frac{124}{24}$$

$$\frac{29 \cdot 3}{8 \cdot 3} = \frac{87}{24}$$

5. Keep the common denominator and subtract the numerators:

$$\begin{array}{r} \frac{124}{24} \\ -\ \frac{87}{24} \\ \hline \frac{37}{24} \end{array}$$

6. Change the result to a mixed number:

$$\frac{37}{24} = 1\,\frac{13}{24}$$

7. Answer:

$$5\,\frac{1}{6} - 3\,\frac{5}{8} = \frac{37}{24} \text{ or } 1\,\frac{13}{24}$$

M. Do adapted application #3.

ADAPTED APPLICATIONS:

1. Use the rules for subtracting fractions from whole numbers. Solve the following problems; expressing your answers as mixed numbers:

	Answers
a) $6 - \frac{2}{3} =$	$5\,\frac{1}{3}$
b) $10 - \frac{5}{6} =$	$9\,\frac{1}{6}$
c) $28 - \frac{6}{11} =$	$27\,\frac{5}{11}$
d) $7 - \frac{3}{5} =$	$6\,\frac{2}{5}$
e) $43 - \frac{7}{9} =$	$42\,\frac{2}{9}$
f) $19 - \frac{5}{8} =$	$18\,\frac{3}{8}$

2. Using the rules for subtracting a mixed number from a whole number, solve the following problems, expressing your answers as mixed numbers:

		Answers
a)	$7 - 4\frac{2}{7} =$	$2\frac{5}{7}$
b)	$14 - 8\frac{7}{10} =$	$5\frac{3}{10}$
c)	$35 - 21\frac{6}{13} =$	$13\frac{7}{13}$
d)	$21 - 6\frac{2}{3} =$	$14\frac{1}{3}$
e)	$9 - 2\frac{1}{5} =$	$6\frac{4}{5}$
f)	$76 - 39\frac{3}{4} =$	$36\frac{1}{4}$

3. Use the rules for subtracting mixed numbers with unlike denominators. Solve the following problems, expressing your answers as mixed numbers.

		Answers
a)	$4\frac{3}{5} - 2\frac{1}{3} =$	$2\frac{4}{15}$
b)	$6\frac{1}{2} - 3\frac{1}{4} =$	$3\frac{1}{4}$
c)	$5\frac{4}{6} - 1\frac{1}{3} =$	$4\frac{1}{3}$
d)	$7\frac{1}{4} - 4\frac{1}{2} =$	$2\frac{3}{4}$
e)	$10\frac{1}{5} - 6\frac{1}{2} =$	$3\frac{7}{10}$
f)	$3\frac{2}{3} - 1\frac{1}{4} =$	$2\frac{5}{12}$

SUMMARY:

1) Preceding the Summary question in FM 1, pg. 59 have the students compute the answers to the following word problems:

   a) Juan has a piece of wood 7 feet long.

      He needs a small piece that measures $\frac{3}{4}$ of a foot to build a box.

      How many feet long will the piece of wood left be?

   b) Tina entered a race that is 4 miles long.

      After an hour she ran $2\frac{2}{3}$ miles.

      How many miles does she have left to run.

   c) Mrs. Santiago has $5\frac{1}{2}$ cups of sugar in a jar.

      She used $1\frac{3}{5}$ cups of sugar to bake some cookies.

      How much sugar does she have left in the jar?

2) Do the Summary in FM 1, pg. 59.

SUGGESTED TEST ITEMS FOR TOPIC 13 THEME 4

NAME: ______________________________

1. Subtract the fractions from each whole number. Express the result as a mixed number.

   a) $12 - \frac{1}{3} =$

   b) $7 - \frac{5}{6} =$

   c) $15 - \frac{3}{7} =$

2. Subtract the mixed numbers from each whole number. Express the answer as a mixed number.

   a) $15 - 9\frac{3}{4} =$

   b) $35 - 19\frac{2}{7} =$

   c) $26 - 19\frac{5}{8} =$

3. Subtract the mixed numbers. Express the answer as a mixed number or proper fraction.

   a) $6\frac{3}{4} - 2\frac{1}{8} =$

   b) $8\frac{1}{3} - 6\frac{3}{4} =$

   c) $3\frac{1}{4} - 2\frac{5}{6} =$

4. Bob lives $2\frac{4}{5}$ miles from the school.

   Jeff lives $3\frac{2}{3}$ miles from the school.

   How much closer to the school does Bob live than Jeff?

UNIT III — THE METRIC SYSTEM

INTRODUCTION

The unit on the metric system serves several major objectives. The obvious ones are to familiarize the students with the various units in the metric system and to enable the students to change and compare units within this system. It must be stressed that conversion from the English system to the metric system is not to be done. The goal of this unit is to have the student internalize the units of measure in the metric system just as they have previously internalized the units of measure in the English system.

Within the framework of the study of the metric system several major arithmetic concepts are introduced and must be emphasized. Students must learn to read and write whole numbers and decimal fractions and correctly express these numbers verbally and symbolically. They must also be able to multiply and divide by powers of ten.

The teacher will note that this adaptation makes one modification in the order in which the lessons in this unit are taught. Lesson 2 in the FM 1 guide, pages 66-68 becomes the first topic in this unit. This topic is treated extensively and requires appropriate emphasis.

Topic One

THEME 1: To learn how to read and interpret large whole numbers.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- name the place value of any whole number up to the million place.
- interpret the meaning of each place value position for whole numbers up to the million place.
- express place value as powers of ten.
- write numerals in expanded form.
- round off numbers to the nearest tens, hundreds, thousands, etc.
- write a numeral given in verbal form.

VOCABULARY ADAPTATIONS:

Additional New Terms: numeral, digit, place value.
Addition Review Terms: whole number, power
Delete: common fraction, decimal fraction, negative exponent,
denominator, lowest terms.

ADAPTATIONS FOR LESSON 2, FM 1, pg. 66-69

ADAPTED CHALLENGE PROBLEM:

The group "Kool and the Gang" had a record album that became a gold record. A record that sells one million or more copies is awarded a gold record. Their record sold 1,253,746 copies. What does the numeral five represent in this whole number?

DEVELOPMENT:

A. Discuss adapted challenge problem. Elicit different answers from students. Teacher should emphasize need for a place value chart to determine where the numeral five falls.

B. Illustrate the following place value chart on chalkboard and prepare one for the students. (This can be used as a permanent visual aid in classroom). Explain that every whole number can be broken down into digits in a place value chart to determine the place value and the value of each digit in the whole number.

MILLIONS	HUNDRED THOUSANDS	TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES

C. Using a place value chart, enter the number from the problem as follows:

MILLIONS	HUNDRED THOUSANDS	TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES
1	2	5	3	7	4	6

D. Elicit from class that the numeral 5 falls in the "ten thousands" place on the chart. Stress the method for placing a whole number on this chart. To determine place value of each digit:

1) Start with the last digit on the right in the whole number. Place that digit in the "ones" column.

2) Work from right to left. Fill in the remaining digits of the numeral in the place value chart.

E. Have students read the whole number with the use of the place value chart. Emphasize that we do not use the word and to separate the numeral: Thus 1,253,746 should be read as follows: "One million, two hundred fifty three thousand, seven hundred forty-six."

F. Do adapted application #1, 2 and 3 and application A in FM 1, pg. 68.

G. Go back to the whole number used in adapted challenge problem and establish value of each numeral:

1,253,746

Develop following chart:

NUMERAL	PLACE VALUE POSTION		NUMBER VALUE
1	MILLIONS - 1,00,000 X 1	=	1,000,000
2	HUNDRED THOUSAND'S = 100,000 X 2	=	200,000
5	TEN THOUSANDS - 10,000 X 5	=	50,000
3	THOUSANDS - 1,000 X 3	=	3,000
7	HUNDREDS - 100 X 7	=	700
4	TENS - 10 X 4	=	40
6	ONES - 1 X 6	=	6
	TOTAL	=	1,253,746

H. Develop a place value chart to illustrate the following as we move from the ones column to each succeeding column, we multiply by an additional ten. Therefore, each column can be represented as a power of ten.

PLACE VALUE	AS A POWER OF TEN	NUMBER VALUE
ONES	$1 \times 10^0 = 1 \times 1$	1
TENS	$1 \times 10^1 = 1 \times 10$	10
HUNDREDS	$1 \times 10^2 = 1 \times 10 \times 10$	100
THOUSANDS	$1 \times 10^3 = 1 \times 10 \times 10 \times 10$	1,000
TEN THOUSANDS	$1 \times 10^4 = 1 \times 10 \times 10 \times 10 \times 10$	10,000
HUNDRED THOUSANDS	$1 \times 10^5 = 1 \times 10 \times 10 \times 10 \times 10 \times 10$	100,000
MILLIONS	$1 \times 10^6 = 1 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$	1,000,000

I. Illustrate the value of each digit in a whole number as follows:

Numeral 5 in the adapted challenge problem has the value of 50,000. This can be computed by multiplying 5 x 10,000 as demonstrated from its position in the place value chart. Thus we can determine the value of each digit in a whole number by multiplying the digit times the number on top of each column in the place value chart.

J. Do adapted applications 4 and 5 and Application B in FM 1 pg. 68. Use chart in G. to illustrate how to write any whole number as an expanded numeral.

Thus

1,253,746 = (1x1,000,000) + (2x100,000) + (5x10,000) + (3x1,000) + (7x100) + (4x10) + (6x1)

1,253,746 = 1,000,000 + 200,000 + 50,000 + 3,000 + 7,000 + 40 + 6

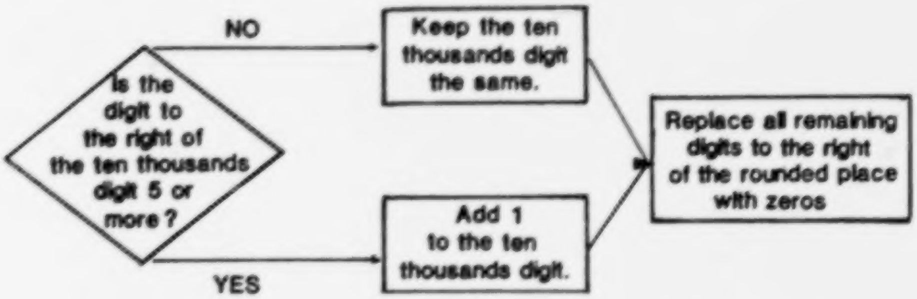
K. Explain that when we break down a whole number as the sum of the value of each numeral in the place value chart we have written that whole number in expanded form.

L. Do adapted application #6

M. Refer to adapted challenge problem. Ask students how they would round off this number to the nearest ten thousand?

1,253,746

Illustrate finding the answer with following diagram:


NO
Is the digit to the right of the ten thousands digit 5 or more?
Keep the ten thousands digit the same.
Replace all remaining digits to the right of the rounded place with zeros
Add 1 to the ten thousands digit.
YES

1,253,746 rounded to the nearest ten thousand is 1,250,000.

Give other examples of rounding off using the above method. Include rounding off to the nearest ten, hundred, thousand, ten thousand, hundred thousand and million.

N. Do adapted application #7.

O. Write the whole number from the challenge problem in verbal form on chalkboard as follows:

One million, two hundred fifty three thousand, seven hundred forty six.

Have students come up and write the numeral from the verbal form.

answer: 1,253,746

P. Do adapted application #8

SUMMARY: Give the number, three million, four hundred sixty one thousand, five hundred seventy two. Ask students to:

a) write the verbal form as a numeral.

b) find the place value of each digit.

c) compute the value of each digit.

d) write the numeral in expanded form.

e) round off the number to the nearest hundred.

ADAPTED APPLICATIONS:

1. Use a place value chart. Enter the following whole numbers into their correct positions on the chart:

a. 2,385
b. 10,267
c. 351,289
d. 603
e. 2,461,350
f. 103,492
g. 1,004
h. 5,493,602

2. Use a place value chart. Find the place value of the circled digits below:

		Answers			Answers
a.	56,4⑦2	(tens)	e)	⑦,368,751	(millions)
b.	6⑧1,357	(ten thousands)	f)	66②,739	(thousands)
c.	714⑨	(ones)	g)	④8,319	(ten thousands)
d.	8,⑤26	(hundreds)	h)	2,⓪58,397	(hundred thousands)

3. Circle the digit that has the place value named in each whole number:

   a. tens digit in - 51,486 (8)

   b. thousands digit in - 1,753,842 (3)

   c. millions digit in - 8,645,337 (8)

   d. ones digit - 3,468 (8)

   e. ten thousands digit in - 648,753 (4)

   f. hundreds - 43,681 (6)

   g. hundred thousands - 6,542,198 (5)

4. What are the place values and values for the circled digit in each of the following whole numbers:

		Place value	Value
a.	61,7④2	(tens - 10)	(40)
b.	3⑧4,679	(ten - thousands - 10,000	(80,000)
c.	4,89⑦	(ones - 1)	(7)
d.	⑥47,323	(hundred thousands - 100,000)	(600,000)
e.	56,③81	(hundreds - 100)	(300)
f.	7,64①,982	(thousands - 1,000)	(1000)
g.	②,681,726	(millions - 1,000,000)	(2,000,000)

5. Use the following clues to build the whole numbers that they represent:

   a) 6 in the tens place, 8 in the thousands place, 1 in the hundreds place, 9 in the ones place. (8,169)

   b) 7 in the hundred thousands place, 4 in the tens place, 3 in the ten thousands place, 5 in the ones place, 2 in the thousands place, 0 in the hundreds place. (732,045)

   c) 4 in the hundreds place, 9 in the ones place, 7 in the tens place. (479)

   d) 6 in the ten thousands place, 3 in the tens place, 9 in the millions place, 7 in the ones place, 4 in the hundred thousands place, 1 in the hundreds place, 0 in the thousands place. (9,460,137)

   e) 0 in the hundreds place, 6 in the thousands place, 0 in the tens place, 6 in the ones space. (6,006)

6. Write the following whole numbers as expanded numerals:

a) 6,451 - (6,000+400+50+1)

b) 152,379 - (100,000+50,000+2,000+300+70+9)

c) 756 - (700+50+6)

d) 4,378,261 - (4,000,000+300,000+70,000+8,000+200+60+1)

7. Round off the following numbers to the place value given:

		Answers
a)	6,453 to the nearest thousand	(6,000)
b)	17,546 to the nearest hundred	(17,500)
c)	853,294 to the nearest ten thousand	(850,000)
d)	3,861,792 to the nearest million	(4,000,000)
e)	81,456 to the nearest ten	(81,460)
f)	2,764,389 to the nearest hundred thousand	(2,800,000)

8. Write the following verbal numbers as whole numbers using number symbols:

		Answers
a)	Seven thousand, eight hundred thirty-two	(7,832)
b)	Six hundred ninety-one thousand, four hundred eighteen.	(692,418)
c)	twenty nine thousand, five hundred seventy-three	(29,573)
d)	Four million, two hundred thousand, six hundred fifty-five	(4,200,655)
e)	Three thousand, two	(3,002)

SUGGESTED TEST ITEMS FOR TOPIC 1

NAME: ____________________________

1. What is the place value of the 7 in each of the following numerals?

		Answers
a)	475	(tens)
b)	75,382	(ten thousands)
c)	9,067	(ones)
d)	739,001	(hundred thousands)

2. What is the value of the 5 in each of the following numerals?

		Answers
a)	352	(50)
b)	1,015	(5)
c)	56,327	(50,000)
d)	5,891,046	(5,000,000)

3. Write the following whole numbers as expanded numerals.

		Answers
a)	2,351	(2,000 + 300 + 50 + 1)
b)	487	(400 + 800 + 7)
c)	83,219	(80,000 + 3,000 + 200 + 10 + 9)
d)	2,034,865	(2,000,000 + 30,000 + 4,000 + 800 + 60 + 5)

4. Round off the following numbers to the place value given.

   a) 453 to the nearest ten (450)
   b) 564,389 to the nearest ten thousand (560,000)
   c) 18,562 to the nearest hundred (18,600)
   d) 4,862,345 to the nearest million (5,000,000)

5. Write the following verbal numbers as whole numbers using number symbols.

   a) Eight hundred nineteen (819)
   b) Forty three thousand, six hundred twenty five (43,625)
   c) Seventy two million, three hundred eighty one thousand, four hundred fifiteen (72,381,415)
   d) Three thousand forty four. (3,044)

Topic One

THEME 2: To learn how to read and interpret decimals.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- name the place value of any digit in a decimal number up to the ten thousandths place.
- interpret the meaning of each place value position for decimals up to the thousandths place.
- express a decimal as a fraction whose denominator is 10, 100, 1000, etc. or
- vice versa.
- write a decimal or fraction given in verbal form.

VOCABULARY ADAPTATIONS:

Additional New Terms:	decimal, tenth, hundredth, thousandth
Additional Review Terms:	digit, numeral, place value, denominator

ADAPTATIONS FOR LESSON 2, FM 1 pgs. 66-69.

CHALLENGE PROBLEM:

"Baseball determines who the best hitter is every year by awarding the batting trophy to the player with the highest batting average. Who would win the batting trophy;

Pete Rose -- 0.312
or Dave Parker -- 0.293"

DEVELOPMENT:

A) Discuss the adapted challenge problem. Elicit the answer from the students. Ask them to explain how they arrived at their answer. You should emphasize that just as there was a need to develop a place value chart for whole numbers, there is a need for a place value chart for decimal numbers. A discussion should be held on what a decimal is and what it represents. Elicit the following important items:

1) A decimal point (.) means "and."

2) The decimal point separates the whole number part from the decimal (fractional) part of a number. Decimal numbers are fractional parts of a number.

B) Illustrate the following place value chart on the chalkboard, and prepare a chart for the students. This may also be used and displayed as a permanent visual aid chart in the classroom. Explain that any whole number can be broken into smaller parts that are called decimal numbers. These decimal numbers fall to the right of the decimal point. Each digit in a decimal number can be placed on a place value chart to determine the place value and the value of each digit in the decimal number.

MILLIONS	HUNDRED THOUSANDS	TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES	DECIMAL POINT	TENTHS	HUNDREDTHS	THOUSANDTHS	TEN-THOUSANDTHS

C) Using a place value chart enter the adapted challenge problem batting average decimal numbers as follows:

MILLIONS	HUNDRED THOUSANDS	TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES	DECIMAL POINT	TENTHS	HUNDREDTHS	THOUSANDTHS	TEN-THOUSANDTHS
						0	.	3	1	2	
						0	.	2	9	3	
							.				
							.				
							.				
							.				

D) Discuss the place value columns that are found to the right of the decimal point. Point out to the class that each column has a name that ends with the letters "th." Emphasize that just as every whole number digit has a specific place value, every decimal number digit has a specific place value and value.

Inform the students of the method for placing decimal numbers on the chart. To determine the place value and value of each digit, start with the first digit and put that digit in the "tenths" column. Working from left to right, fill in each digit in the place value chart.

E) Have the students read the decimal numbers with the use of a place value chart. Emphasize that we use the word and to separate the whole numbers from the decimal numbers. That is why we stated earlier that we do not use and to separate whole numbers from one another. Mixed numbers can be written as whole numbers and decimal numbers, such as [4.27]. The 4 is a whole number, to the left of the decimal point, and .27 is a decimal number to the right of the decimal point.

When reading the decimal part of a number it should be read as follows:

1. Read the number to the right of the decimal point as you would read whole numbers.

2. Number of digits after the decimal point is read as:

one (1) number after. - ex. 0.1	tenths - ex. one tenth
two (2) numbers after. - ex. 0.23	hundredths - ex. twenty-three hundredths
three (3) numbers after. - ex. 0.456	thousandths - ex. four hundred fifty-six thousanths
four (4) numbers after. - ex. 0.7890	ten thousandths - ex. seven thousand, eight hundred ninety ten thousandths

Thus, the numbers used in the challenge problem would be read as follows:

1. 0.312 - Zero and three hundred twelve thousandths (3 numbers after the decimal point).
   0.293- Zero and two hundred ninety three thousanths (3 numbers after the decimal point).

G) Use the decimal numbers of the adapted challenge problem to establish a value for each digit. Emphasize that decimal numbers, since they represent parts of whole numbers, are higher in value the nearer they are to the decimal point. Thus, tenths are higher in value than hundredths, and hundredths are higher in value than thousandths and thousandths are higher in value than ten thousandths. In other words, when reading decimal numbers, the digit furthest to the left has the greatest value, just as in whole numbers.

EXAMPLE:	WHOLE NUMBER	DECIMAL NUMBER
	479.	.689
	furthest to the left is the hundreds place and greatest value digit.	furthest to the left is the tenths place and greatest value digit.

H) Do adapted application #4 and application C in FM 1, pg. 68.

I) When we are determining which decimal number has the greatest value we use the first digit after the decimal. Using the challenge problem - .312 is larger than .293 because the first digit after the decimal points, 3 is greater than 2, thus .312 is greater than .293.

When we compare decimal numbers, and we see that the first digit after (to the right of) the decimal point is the same, we must compare the second digit in the numbers to determine which is larger.

i.e.- Basketball Free Throw Percentages for 1982:

Larry Bird - 0.836
Julius Erving - 0.829
Magic Johnson - 0.817

In this case, the first digit after the decimal point in all three averages is the same (8). We now compare the second digit and see that Larry Bird's is .83, Julius Erving's is .82 and Magic Johnson's is .81. Thus, Larry Bird had the highest average because the hundredth digit in this average was greater than the hundredth digit in both Doctor J's and Magic's average.

When comparing decimal numbers we must find the largest digit in the first place value column where the digits are different. If the tenth, hundredth and thousandth digits are the same, then we should compare the ten thousandth digit.

i.e. In 1978, the trophy for the highest batting average in the American League was determined by the ten thousandth digit for two players' batting averages. Who won the A.L. Batting Trophy for 1977?

George Brett (K.C. Royals) - 0.3342
Hal McRae (K.C. Royals) - 0.3347

The answer is Hal McRae. He won because even though the tenth, hundredth and thousandth digits were the same(.334), the ten thousandth digits were different and McRae's "7" ten thousandth digit was larger than Brett's ten thousandth digit "2". Thus Hal McRae had the higher batting average, because 0.3347 is greater than 0.3342

J) Do adapted application #5.

K) We discussed the fact that decimal numbers are actually parts of a whole number. Ask the students, "What other math topic dealt with parts of a whole object?" Elicit the answer, "fractions." Ask for examples of fractions: such as the ruler fractions of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$.

Since decimal numbers are fractional parts of a number, they can also be written as common fractions having a numerator and denominator. The denominators of all decimal fractions are powers of 10, and are shown below:

TENTHS = decimal number of .1 = common fraction of $\frac{1}{10}$

HUNDREDTHS = decimal number of .01 = common fraction of $\frac{1}{100}$

THOUSANDTHS = decimal number of .001 = common fraction of $\frac{1}{1000}$

TEN THOUSANDTHS = decimal number of .0001 = common fraction of $\frac{1}{10,000}$

Thus, to express a decimal number as a common fraction do the following:

- The numerator becomes the numeral without the decimal point.
- The denominator becomes the power of ten indicated by the place value of the digit furthest to the right.

i.e. a) Write the following as a decimal number and a fraction: "Sixty-eight hundredths;"

Decimal Number = .68 sixty-eight is 68, and hundredths indicates two digits to the right of the decimal point.

Fraction = $\frac{68}{100}$ sixty-eight, or 68 is the numerator and hundredths, or 100 is the denominator.

b) Write the following as a decimal number and a fraction: "Eight hundred fifty-two thousandths";

Decimal Number = .852 eight hundred fifty two is 852, and thousandths indicates three digits after the decimal point.

Fraction = $\frac{852}{1000}$ eight hundred fifty-two, or 852 is the numerator and, 1,000 is the denominator.

c) Write the following as a decimal number and a fraction: "Thirty-nine ten thousandths";

Decimal Number = .0039 Thirty-nine is 39, and ten thousandths indicates four digits after the decimal point.

NOTE: An important concept to stress is that zeroes after the decimal point and before other numerical digits (1,2,3,4,5,6,7,8,9,) have value and must not be omitted from the decimal number. They must be added before the 39 to make the decimal number correct.

Fraction = $\frac{39}{10,000}$ Thirty-nine, or 39 is the numerator and ten thousand, or 10,000 is the denominator

L) Do adapted application #7, and applications D, E, and F in FM 1, pg 68.

M) In the question about the 1977 batting trophy, we discussed that Hal McRae's average of .3347 was higher then George Brett's average of .3342. Ask the students if there might be an easier way of stating the two batting averages, using a method we discussed in the section on whole numbers. Elicit that we can "round off" the final digit, expressing the two averages as follows: McRae's 0.3347 and Brett's 0.3342 are expressed in ten thousandths, since there are four digits after the decimal point. If we round them off to the nearest thousandth, or 3 digits after the decimal point, we do the following;

1) If the digit directly after the digit to be rounded off is a 5 or higher, (5,6,7,8,9,) we add 1 to the digit being rounded off, and drop all digits after the rounded off digit.

2) If the digit directly after the digit to be rounded off is a 4 or lower (0,1,2,3,4,) we leave the digit being rounded off the same and drop all other digits. Thus, with the two batting averages we round them off as follows:

a) McRae's = .3347. Since the digit directly after the thousandths digit of 4 is a 5 or higher (7) we add 1 to the 4, which makes the new thousandth digit a 5. Drop all other digits after that. Thus .3347 rounded off to the nearest thousandth is .335.

b) Brett's = .3342. Since the digit directly after the thousandth digit of 4 is a 4 or lower (2), we leave the 4 as is, and drop all other digits. Thus, .3342 rounded off to the nearest thousandth is .334. .3347 or .335 is greater than .3342, or .334.

N) Do adapted application #8.

ADAPTED SUMMARY:

1) Given the numeral twenty seven and five hundred sixty four thousandths:

   a) write the verbal form as a numeral
   b) find the place value of each digit
   c) compute the value of each digit
   d) round off the numeral to the nearest hundredth
   e) change the decimal to a fraction

2) Do Summary in FM 1, pg. 69.

ADAPTED APPLICATIONS:

1) Use a place value chart. Enter the following decimals in their correct positions on the chart.

a) .2304
b) .026
c) 5.1
d) 2.047
e) 35.6842
f) 479.36
g) .9094
h) 18.005

2) Use a place value chart. What place value would the circled number fit into?

	Answer		Answer
a) .38	(hundredths)	e) 5.3604	(thousandths)
b) .2057	(ten thousanths)	f) 39.72	(tens)
c) 13.864	(tenths)	g) 125.6	(tenths)
d) 259.01	(ones)	h) .0028	(hundredths)

3) Circle the digit that represents the place value asked for in each decimal.

		Answer
a) tenths digit	2.35	(3)
b) thousands digit	0.678	(8)
c) hundreds digit	19.371	(7)
d) tenths digit	.18	(1)
e) ten thousandths digit	152.6843	(3)

4) What are the place values and values for the circled digit in each of the following decimal numbers?

	Place Value	Value
a) 345.⑥	(tenths .1)	(.6)
b) 963.7⑤	(hundredths .01)	(.05)
c) ②3.08	(tens 10)	(20)
d) .345⑦	(ten thousandths .0001)	(.0007)
e) 106.54③	(thousandths .001)	(.003)
f) 5.⓪42	(tenths .1)	(.0)

5) Write the following verbal decimal numbers as decimal numbers using number symbols:

a) twelve and six tenths

b) nineteen hundreths

c) thirty seven and five hundreths

d) five hundred nine thousandths

e) four and six hundred thirteen thousandths

6) Circle the larger number in each pair:

a) .327 _____ .372

b) .14 _____ .2

c) 5.04 _____ 5.40

d) 29.77 _____ 29.777

e) .342 _____ .2450

7) Write the following decimals as common fractions:

a) .23

b) 5.6

c) .751

d) 19.48

e) 4.25

f) .1729

8) Round off the following decimal numbers to the nearest hundreth.

a)	.345	(.35)
b)	.262	(.26)
c)	5.968	(5.97)
d)	25.754	(25.75)
e)	86.409	(86.41)

CALCULATOR APPLICATION FOR TOPIC 1, THEME #2

1) A major concept introduced in this theme is the direct relationship between fractions and decimal numbers. This concept is introduced in Development #5 in FM 1, pgs. 67-68, as well as Adapted Development K.

2) It is important to remember that all denominators in the fractions will be based on the powers of ten. This will become increasingly important as we progress through Unit 3 on the metric system.

3) The first application of this concept is to convert verbal phrases into decimal numbers: i.e. "Forty two hundredths = .42" The next application is to convert a decimal number to a fractional number, i.e. .42 = $\frac{42}{100}$.

4) At this point the calculator may be used in the classroom. Review the meaning of a fraction, i.e. the denominator is all of the parts of the number, the fraction bar line means "to divide by", and the numerator is the part of the whole number being worked into, so that $\frac{42}{100}$ can be read as "42 divided by 100", or 42 ÷ 100.

5) Review with the students, the actual physical steps used to enter an arithmetic problem into the calculator, i.e. "42 ÷ 100 =" should be entered as;

   a) the numeral 4,
   b) the numeral 2,
   c) the ÷ sign,
   d) the numeral 1,
   e) the numeral 0,
   f) the numeral 0,
   g) the = sign.

   The answer .42 will be displayed on the calculator. Illustrate $\frac{42}{100}$ = 42 ÷ 100 = .42 on the chalkboard.

6) The calculator should be used, again, to check the student's own self-calculated answers. It can be used for Adapted Application #7, and Applications E and F in FM 1, pg. 69.

SUGGESTED TEST ITEMS FOR TOPIC 1 THEME 2

NAME: ____________________________

1) What is the place value of 7 in each of the following numerals?

	Answer
a) 4.07	(hundredths)
b) 0.617	(thousandths)
c) 37.256	(tens)
d) 28.3457	(ten thousandths)

2) What is the value of 3 in each of the following numerals?

	Answer
a) 28.364	(three tenths or $\frac{3}{10}$)
b) 0.453	(three thousandths or $\frac{3}{1000}$)
c) 19.0324	(three hundredths or $\frac{3}{100}$)
d) 0.7083	(three ten thousandths or $\frac{3}{10,000}$)

3) Write the following decimals as fractions

		Answer
a) .42	____________	$\frac{42}{100}$
b) 0.8	____________	$\frac{8}{10}$
c) 6.341	____________	$6 \frac{341}{1000}$
d) 0.5027	____________	$\frac{5,027}{10,000}$

4) Circle the larger number in each pair.

	Answer
a) .451 _______ .415	(.451)
b) .23 _______ .3	(.3)
c) 58.66 _______ 58.666	(58.666)
d) .947 _______ .4972	(.947)

5) Round off the following decimal numbers to the nearest hundreth.

	Answer
a) .256 _______	(.26)
b) .561 _______	(.56)
c) 4.968 _______	(4.97)
d) 32.643 _______	(32.64)
e) 654.307 ______	(654.31)

6) Write the following verbal decimal numbers as decimal numbers using number symbols.

a) eleven and three tenths _______ (11.3)

b) fourteen hundredths _______ (0.14)

c) sixty two and seven thousandths ______ (62.007)

d) thirty eight ten thousandths ______ (.0038)

Topic Two

THEME: To learn about the units of linear measurement in the metric system.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- identify the meter as the basic unit of linear measure in the metric system.
- express the numerical relationships between the meter and the millimeter, the centimeter, and the kilometer.
- recognize (visually) the similarity of the meter and the yard without making conversions.
- recognize the relative sizes of and indicate appropriate uses for the millimeter, centimeter and kilometer.

ADAPTATIONS FOR LESSON 1, FM 1 pgs. 63-65.

DEVELOPMENT:

A) The following charts should be used as visual aids as part of deveopment 3 in FM 1 pg. 64.

UNIT OF MEASUREMENT	SYMBOL	METRIC PREFIX	MEANING OF PREFIX	LENGTH IN RELATION TO METERS
KILOMETER	km	Kilo	One Thousand-1000	1000 Meters
HECTOMETER	hm	Hecto	One Hundred-100	100 Meters
DEKAMETER	dkm	Deka	Ten-10	10 Meters
METER	m	-	-	1 Meter
DECIMETER	dm	Deci	One Tenth of - 0.1 or $\frac{1}{10}$	0.1 or $\frac{1}{10}$ Meter
CENTIMETER	cm	Centi	One Hundredth of - 0.01 or $\frac{1}{100}$	0.01 or $\frac{1}{100}$ Meter
MILLIMETER	mm	Milli	One Thousandth of - 0.001 or $\frac{1}{1000}$	0.001 or $\frac{1}{1000}$ Meter

NOTE: Point out that the metric system of measurement, unlike the English system which is based on feet and inches, is based on measurements in powers of ten. Thus, the metric system can be depicted, like whole numbers and decimals, in place value charts as below;

THOUSANDS	HUNDREDS	TENS	ONES	TENTHS	HUNDREDTHS	THOUSANDTHS
KILOMETERS	HECTOMETERS	DEKAMETERS	METERS	DECIMETERS	CENTIMETERS	MILLIMETERS
1000 m	100 m	10 m	1 m	.1 m	.01 m	.001 m
10x10x10x1m	10x10x1m	10X1m	1 m	$\frac{1}{10}$ m	$\frac{1}{100}$ m	$\frac{1}{1000}$ m

SUMMARY:

1) Place the symbol $>$, or $<$ between each pair of units to make the statement true.

   a) centimeter ______ kilometer

   b) kilometer ______ centimeter

   c) meter _______ centimeter

   d) millimeter _______ centimeter

   e) centimeter _______ meter

2) A pool is 40 feet long from end to end. Home plate to second base on a baseball field is almost 40 meters long. Which is longer?

3) Mrs. Rivera bought 5 yards of material to make a dress. Mrs. Brown bought 5 meters of material to make a dress. Who bought more material?

4) Arrange the following units of length from smallest to largest:

   centimeter
   kilometer
   millimeter
   meter

ADAPTED APPLICATIONS:

1) For each of the following, write the abbreviation for the unit that would probably be used to measure length, width or distance. Select units from the following: mm, cm, m, km.

   a) length of a banner

   b) the height of the Statue of Liberty

   c) the width of a window

   d) the distance from California to Hawaii

   e) the thickness of a notebook

2. Match the number with the letter.

a) millimeter	1. $\frac{1}{100}$ meter
b) kilometer	2. $\frac{1}{1000}$ meter
c) centimeter	3. 1000 meters

SUGGESTED TEST ITEMS FOR TOPIC 2

1) For each of the following, write the abbreviations for the unit that would probably be used to measure length, width or distance. Select units from the following: mm, cm, m, km.

   a) The length of a kitchen. ________ (m)

   b) The distance a car can travel in one hour. _______ (km)

   c) The length of a pencil. _______ (cm)

   d) The thickness of a quarter. _______ (mm)

   e) The height of your friend. _______ (m)

   f) the width of a nail file. _______ (mm)

2. Match the number with the letter.

		Answers
a. Centimeter	1. 1000 meters	(a-2)
b. Millimeter	2. $\frac{1}{100}$ meter	(b-3)
c. Kilometer	3. $\frac{1}{1000}$ meter	(c-1)

3. Solve the following problems:

   1. Tom's room measured 12 feet long. Dominic's room measured 12 meters long. Whose room is shorter? (Tom's)

   2. Larry bought 23 meters of carpet for his living room. Mario bought 23 yards of carpet for his living room. Who bought more carpet? (Larry)

Topic Three

THEME: To learn about the metric ruler and the relationship between the meter and the centimeter.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- Identify and read the centimeter markings on a metric ruler.
- Express the sub-divisions of a centimeter as tenths of a centimeter.
- Express the sub-divisions of a centimeter as a decimal number.
- Multiply whole numbers by 10, 100, and 1,000.
- Multiply decimal numbers by 10, 100, and 1,000.
- Measure lengths in meters and centimeters with a ruler.
- Apply the rule for converting meters to centimeters by multiplying by 100.

VOCABULARY ADAPTATIONS:

Additional Review Terms: decimal number

ADAPTATIONS FOR LESSON 3, pgs. 70-72

DEVELOPMENT:

A) Prior to Development #4, in FM 1, pg. 71, spend a period of time teaching the rules for multiplying by 10 and it's powers.

Ask the students what the phrase "power of ten" means, and where they have used that term before. Elicit that it represents the number 10 and all of the numbers obtained by multiplying by 10, such as 100 and 1,000. Elicit that we used powers of ten in the place value chart for whole numbers and decimal numbers.

Ask the students where else they have recently seen the "powers of ten" being used. Elicit that this is used in the metric system of measurement. Explain that since we are to learn how to measure objects in the metric system it would be useful to know how to multiply whole numbers and decimal numbers by the "powers of ten."

B) List the following equations on the chalkboard:

1) 7 x 10 = 70
2) 6 x 100 = 600
3) 5 x 1,000 = 5,000
4) 4 x 10,000 = 40,000

Ask: "Can you give us a rule for multiplying whole numbers by powers of ten?"

Elicit that "multiplying any whole number by 10, has the effect of moving the decimal point one place to the right. That is, 7 is the same as (7.) and 7. x 10 = 70. The zero serves as a place holder." Similarly, multiplying by 100 has the effect of moving the decimal point two places to the right. 6 is the same as (6.), and 6.x 100 = 600. Continue with multiplication by 1000 and 10,000.

C) DO ADAPTED APPLICATION #1

D) List the following equations on the chalkboard:

1) 6.4 x 10 = (64.)   3) 9,872 x 1,000 = (9,872.)

2) 3.79 x 100 = (379.)

Ask: "Can you give me a rule for multiplying decimal numbers by ten and it's powers?"

Elicit that multiplying decimals by powers of ten consists of moving the decimal point to the right as follows:

1) When you multiply a decimal number by 10, move the decimal point one digit to the right, i.e. - 2.79 x 10 = $2.\underset{\curvearrowright}{7}.9$ or 27.9

2) When you multiply a decimal number by 100, move the decimal point two digits to the right, i.e. - 2.79 x 100 = $2.\underset{\curvearrowright}{79}.$ or 279.

3) When you multiply a decimal number by 1,000, move the decimal point three digits to the right, i.e. 2.79 x 1000 = $2.\underset{\curvearrowright}{790}.$ = 2,790.

NOTE: Stress when the decimal point moves to the right it may be necessary to add zeroes to hold the place between the last digit given and the new position of the decimal point.

Point out that when decimal numbers of tenths (one digit after the decimal point) are multiplied by ten the resulting answer will always be a whole number (tenths x ten = whole number)

i.e - 4.5 x 10 = 45. or 45
tenths ten whole number

17.8 x 10 = 178. or 178
tenths ten whole number

This is also true for - hundredths x hundred = whole number, and Thousandths x thousand = whole number.

i.e - 6.81 x 100 = 681. or 681
hundredths hundred whole number

2.59 x 100 = 259. or 259
hundredths hundred whole number

3.617 x 1,000 = 3,617. or 3,617
thousandths thousand whole number

46.952 x 1,000 = 46,952. or 46,952
thousandths thousand whole number

E) DO ADAPTED APPLICATION #2

F) DO DEVELOPMENT 4,5,6,7 and 8 in FM 1, pg. 71-82.

NOTE: THE TEACHER MUST PROVIDE EVERY STUDENT WITH A CM RULER FOR THESE DEVELOPMENTS.

SUMMARY:

A) Fill in the blanks below with a word that makes the sentence true.

1) The hundred small units on a meter stick are called __________.

2) One hundred centimeters = __________ meter.

3) One hundredth of a meter is called a __________.

4) One tenth of a centimeter is called a __________.

B) Solve the following problem:

Jason measured the teacher's desk. He found it to be 1.4 meters long. Mona measured the teacher's desk and found it to be 144 centimeters long. Which pupil found it to be longer?

C) DO SUMMARY in FM 1, pg. 72

ADAPTED APPLICATIONS:

1) Compute the answers to the following multiplications:

a) 23 x 10 =

b) 10 x 381 =

c) 47 x 100 =

d) 1000 x 20 =

e) 96 x 10 =

f) 476 x 100 =

g) 10 x 59 =

h) 304 x 1000 =

2) Compute the answers to the following multiplications:

a) 2.3 x 10 =

b) .687 x 100 =

c) 10 x .395 =

d) 42.6 x 1000 =

e) 0.5 x 100 =

f) 387.75 x 10 =

g) 100 x .001 =

h) 0.843 x 1000 =

SUGGESTED TEST ITEMS FOR TOPIC 3

Name ______________________________

1. Compute the answers to the following multiplications:

   a) 67 x 10 = (670)
   b) 4.8 x 10 = (48)
   c) 843 x 100 = (84,300)
   d) .82 x 100 = (82)
   e) 596 x 1,000 = (596,000)
   f) .713 x 1,000 = (713)
   g) 16.58 x 10 = (165.8)
   h) .7 x 100 = (70)
   i) 29.6 x 100 = (2,960)
   j) .381 x 10 = (3.81)

2. Convert each measurement to centimeters:

   a) 7m = (700) cm
   b) 68m = (6,800) cm
   c) 5.94m = (594) cm
   d) 0.061m = (6.1) cm
   e) 0.3m = (30) cm

Topic Four

THEME: To learn about the relationship between the centimeter and the millimeter, and between the meter and the millimeter.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- identify and read the millimeter markings on a meter ruler.
- convert linear measurements from centimeters to millimeters by multiplying by 10.
- convert linear measurements from meters to millimeters by multiplying by 1,000.
- multiply whole and decimal numbers by the powers of ten by moving the decimal point to the right.
- measure the lengths of objects in the unit of millimeters.

ADDITIONAL VOCABULARY ADAPTATIONS:

New Terms: infinite
Additional Review Terms: whole numbers, decimal numbers, digit, decimal point.

ADAPTATIONS FOR LESSON 4, pgs 73-74

DEVELOPMENT:

A) A major concept of this topic is the conversion of larger units of measure to smaller units of measure. It is important to emphasize the following concepts to the students; (have them copy into their notebooks)

1) When we change from larger units to smaller units, we will use the operation of multiplication.

2) When we change from larger metric units to smaller metric units we will always multiply by a power of ten (10,100,1,000,etc...)

3) When we multiply by a power of ten, we move the decimal point of the number being changed to the right. Move as many places as the exponent in the power of ten.

NOTE: It is essential to establish that in a whole number there is a decimal point to the right of the ones place. Emphasize to the students that quite often that decimal point will not be shown, but it should be added (23=23.)
It also must be pointed out to the students that in any whole number there are an unlimited (infinite) amount of zeroes to the right of the decimal point (23 = 23.00000.....). Thus, when the students are multiplying whole numbers by powers of ten they must add the decimal point and place zeroes after that decimal point to make the computation of the problem easier. Illustrate this on the chalkboard; i.e. $396 \times 10^1 = 396.00 \times 10 = 396.00 = 3,960$.

Examples: a) 10^1 = 10 move the decimal point 1 place to the right.
i.e. 15 x 10^1 = 15.0 x 10 = 15.0. = 150.

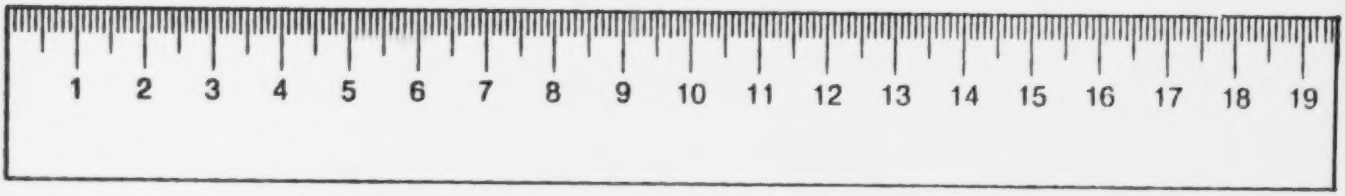
b) 10^2 = 100; move the decimal point 2 places to the right.
i.e. = 63 x 10^2 = 63.00 x 100 = 63.00. = 6,300

c) 10^3 = 1,000; move the decimal point 3 places to the right.
i.e., = 84 x 103 = 84.000 x 1,000 = 84.000. = 84,000.

A. The teacher should note that there is an easier method for some students. The decimal point may be moved to the right the same number of places as there are zeroes in the power of ten number;

i.e. 10 has 1 zero; move 1 place to the right
100 has 2 zeroes; move 2 places to the right.
1,000 has 3 zeroes; move 3 places to the right.

B) The teacher should provide a metric ruler, with millimeter markings, for every student in the class. This provides both a visual example of the mm and cm size, and can be used in practical measuring applications. Photocopy the following metric ruler, and attach a cardboard backing, for the student's classromm use.



C) Do Adapted Applications #1, 2 and 3 after Application C, in FM 1, pg. 74.

ADAPTED SUMMARY:

A) After eliciting summary #1 in FM 1 p. 74 develop following chart: (visual aid chart)

Change from larger to smaller:

centimeters (cm) to millimeters (mm) multiply by 10

meters (m) to centimeters (cm) multiply by 100

meters (m) to millimeters (mm) multiply by 1000

B) Fill in the blanks below with the correct answer:

1. The prefix "milli" means __________.

2. One centimeter = __________ millimeters.

3. One meter = __________ centimeters.

ADAPTED APPLICATIONS:

1. Use your metric ruler to draw line segments of the following lengths:

   a) 7 cm
   b) 35 mm
   c) 4.6 cm
   d) 63 mm
   e) 15.5 cm
   f) 8 mm
   g) 2 cm
   h) 100 mm

2. Measure the following with a metric ruler and record your answers in millimeters:

   a) the width of a board eraser
   b) the length of a paper clip
   c) the thickness of your nose
   d) the width of your desk

3. Write the correct symbol " $<$, =, or $>$ ", between each pair of measurements.

   a) 42 cm _____ 420 mm

   b) 7.4 m _____ 740 mm

   c) 18m _____ 1800 mm

   d) 19.4 cm _____ 1940 mm

   e) 400 cm _____ 4000 mm

CALCULATOR APPLICATION:

1. A major concept introduced in this topic is the multiplication of whole numbers and decimal numbers by the powers of ten. It is essential for the students to grasp the concept that this computational process requires movement of the decimal point towards the right, thus increasing the value of the number being multiplied. This concept is introduced in Development #1 in FM 1, pg. 73, and Adapted Development A.

2. It is important to remember that all multipliers will be whole numbers in the powers of ten (10,100,1,000) as the metric units of linear measurement are all based on the powers of ten.

3. The first application of this concept is multiplying any whole number by 10. The students should understand that the decimal point moves one space to the right i.e. 7. x 10 = 7.0 = 70.

   They are taught that multiplying the number by 100 will move the decimal point two spaces to the right- i.e. 7. x 100 = 7.00. = 700., and so on.

4. The teacher should review, with the students, the actual physical steps used to enter an arithmetic problem into the calculator, i.e. 7. x 100 = should be entered as: a. the numeral 7, b. the decimal point, c. the multiplication (x) sign, d. the numeral 1, e. the numeral zero, f. the numeral zero, and g. the = sign.

   The answer 700, will be displayed on the calculator.

5. An interesting application would be to have the students multiply a number by 10, record the answer, multiply the answer by 10 record that answer, multiply that answer by 10, record the answer, etc. The students, by observing the series of answers, may see the movement of the decimal point to the right, and the increase in value for each space moved to the right. They might grasp the concept that the decimal point moves to the right for each increase in the exponent of ten. Illustrate this application on the chalkboard.

   $7 \times 10^1 = 7 \times 10 = 70$
   $7 \times 10^2 = 7 \times 10 \times 10 = 70 \times 10 = 700$
   $7 \times 10^3 = 7 \times 10 \times 10 \times 10 = 70 \times 10 \times 10 = 700 \times 10 = 7{,}000$

6. These procedures should be used for multiplication of decimal numbers by the powers of ten. This application more clearly illustrates the decimal movement. (Hint) As an introductory example use a decimal number to the ten thousandths place, and multiply up to 10^4. i.e.

   a. $.4372 \times 10^1 = 4.372$
   b. $.4372 \times 10^2 = 43.72$
   c. $.4372 \times 10^3 = 437.2$
   d. $.4372 \times 10^4 = 4372.$

   This will also reinforce that tenths x ten = whole number, hundredths x 100 = whole number, etc.

SUGGESTED TEST ITEMS FOR TOPIC 4

Name ______________________________

1. Compute the answers to the following multiplications:

   a. 7 x 100 = (700)

   b. 9.31 x 10 = (93.1)

   c. 458 x 1,000 (458,000)

   d. .5 x 100 = (50)

   e. 2.876 x 10 = (28.76)

   f. 36.8 x 1,000 = (36,800)

2. Convert the following centimeter measurements to millimeters:

   a. 7 cm = (70) mm

   b. 86 cm = (860) mm

   c. 0.4 cm = (4) mm

   d. 6.02 cm = (60.2) mm

   e. 256 cm = (2,560) mm

3. Convert the following meter measurements to millimeters:

   a. 4 M = (4,000) mm

   b. 7.2 m = (7,200) mm

   c. .8m = (800) mm

   d. .93 m = (930) mm

   e. .07 m = (70) mm

4. Write the correct symbol "<, =, or >", between each pair of measurements:

   a. 37 cm _____ 370 mm

   b. 69 cm _____ 6900 mm

   c. 6.3 m _____ 630 mm

   d. 26.9 m _____ 26,900 mm

Topic Five

THEME: To learn how to change smaller units of metric measurement to larger units of metric measurement.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- divide whole numbers by the powers of ten. (10,100,1000)
- divide decimal numbers by the powers of ten. (10,100,1000)
- apply the rule for converting millimeters to centimeters by dividing by 10.
- apply the rule for converting centimeters to meters by dividing by 100.
- apply the rule for converting millimeters to meters by dividing by 1,000.

VOCABULARY ADAPTATIONS:

Additional Review Terms: powers of ten, opposite

ADAPTATIONS FOR LESSON 5 IN FM 1 pgs. 75-76

DEVELOPMENT:

A) After discussing the challenge problem in FM 1 pg. 75, it will be necessary to have a complete development on the methods used for dividing numbers by the powers of ten.

Review the phrase "powers of ten", and that we used powers of ten in the place value chart for whole numbers, decimal numbers and for converting larger metric units into smaller metric units. Ask the students, "What operation is the opposite of Multiplication?" Elicit the answer, "Division". Then ask: "If we used multiplication to change larger metric units to smaller metric units, how might we convert smaller units into larger units?" Again, elicit, "Division".

B) Review the units of measure in the metric system and how they are related to the powers of ten; i.e. 1m=100cm=1,000mm.

Ask the students, "If I wanted to change a measurement in centimeters into a measurement in meters, what might be an easy method to do this?" Elicit dividing the smaller unit of measurement (cm) by a "power of ten" (100),

C) List the following equations on the chalkboard;

1) $56 \div 100 = .56$

2) $\frac{38}{10} = 3.8$

3) $947 \div 1{,}000 = .947$

4) $\frac{8613}{100} = 86.13$

Ask, "Can you give a rule for dividing whole numbers by the powers of ten?"

Elicit: "Dividing any whole number by ten has the effect of moving the decimal point one place to the left. That is, 7 is the same as 7., so $7. \div 10 = .7$, and similarly dividing by 100 has the effect of moving the decimal point two spaces to the left. That is, 6 is the same as 6., so $6. \div 100 = .06$

NOTE: It is essential to emphasize that zeroes must be used as "place holders" when moving to the left. For example 6. ÷ 100 is not .6, but .06, and the zero is needed to have the 6 in the hundredths place. $\frac{6}{100}$ is not six tenths (.6), but six hundredths (.06).

D) List the following equations on the chalkboard;

1) $3.9 \div 10 = .39$

2) $98.72 \div 100 = .9872$

3) $651 \div 1{,}000 = .651$

4) $\frac{4}{100} = .04$

Ask, "Can you give a rule for dividing decimal numbers by "the powers of ten?"

Elicit that the decimal point will move to the left the same number of spaces as the exponent in the division, or same as the number of zeroes in the power of ten number;

i.e. 10^1=10=1 zero=1 place to the left when you divide by 10.
10^2=100=2 zeroes=2 places to the left when you divide by 100.
10^3=1,000=3 zeroes=3 places to the left when you divide by 1000.

Stress, that when the decimal point moves to the left it may be necessary to add zeroes to hold the place value between the left most digit of the given number and the new position of the decimal point; i.e. $8 \div 1{,}000 = .008$ or $63 \div 1000 = .063$

E) DO ADAPTED APPLICATIONS #1 and 2

F) Have the students copy the following concepts into their notebooks;

1) When changing from smaller units to larger units, use the operation of division.

2) When changing from smaller metric units to larger metric units divide by a power of ten (10,100,1000, etc)

3) When dividing by a power of ten, move the decimal point of the number being changed to the left. Move as many places as the exponent, or number of zeroes, in the power of ten in the division.

G) ELABORATE ON DEVELOPMENT #2 in FM 1, pg 75.

Use the metric ruler. Have the students count the number of millimeter markings in each centimeter. Establish that there are ten markings, or ten millimeters in each centimeter. Ask, "How many mm are there in 3 cm?" Elicit 30mm, and ask how they arrived at the answer (1cm=10mm, so 3 cm=3 x 10 = 30mm)

Ask, "How many cm are there in 50 mm? "Explain that this is the opposite of the previous question, therefore the opposite operation will be used. i.e. 10mm = 1cm so 50mm = $50 \div 10 = 5$ cm.

H) Do adapted Application #3 and Application A, in FM 1, pg. 76.

I) Use the same methodology used in Adapted Development G to illustrate that:

1) 100cm=1m. To convert cm to m we divide the centimeters by 100, or move the decimal point two spaces to the left;
i.e. 470cm=470. ÷ 100=4.70. or 4.7m.

2) Likewise 1,000mm=1m. To convert mm to m we divide the millimeters by 1,000, or move the decimal point three spaces to the left;
i.e. 470cm=470 ÷ 1,000 = ,470.or .470m

J) Do Adapted Applications 4, 5, 6 and Application B in FM 1, pg. 76.

K) Omit Cliff-hanger, in FM 1 pg. 76.

APPLICATIONS:

1. Complete the answers to the following divisions:

a) 53 ÷ 10 = (5.3)

b) $\frac{625}{100}$ = (6.25)

c) $\frac{8450}{1000}$ = (8.450 or 8.45)

d) $10\overline{)99}$ = (9.9)

e) 680 ÷ 100 = (6.80 or 6.8)

f) $\frac{1000}{1000}$ = (1.000 or 1)

g) 423 ÷ 100 = (4.23)

h) 288 ÷ 10 = (28.8)

2. Compute the answers to the following divisions:

a) 0.38 ÷ 10 (.038)

b) 15.1 ÷ 100 (.151)

c) $\frac{.930}{10}$ (.0930 or .093)

d) $\frac{7.613}{10}$ (.7613)

e) $\frac{79.65}{100}$ (.7965)

f) 83.2 ÷ 10 (8.32)

g) $\frac{16.08}{100}$ (.1608)

h) $\frac{2.375}{1000}$ (.002375)

3. Change each of the following measurements from mm to cm

a) 35mm (3.5)

b) 216mm (21.6)

c) 49.7mm (4.97)

d) 8.2mm (.82)

e) 0.2mm (.02)

f) 2500mm (250.0 or 250)

4. Change each of the following measurements from cm to m:

a) 37 cm (.37)
b) 246 cm (2.46)
c) 4500 cm (45.00)
d) 238.6 cm (2.386)
e) 6.4 cm (.064)
f) 900 cm (9.00)
g) 326.35 cm (3.2635)
h) 9 cm (.09)

5. Change each of the following measurements from mm to m:

a) 2000 mm (2.000 or 2)
b) 3840 mm (3.840 or 3.84)
c) 725 mm (.725)
d) 85 mm (.085)
e) 346.5 mm (.3465)
f) 12,000 mm (12)
g) 9 mm (.009)
h) 600 mm (.600 or .6)

6. Place the correct symbol >, =, or < between each pair of measurements.

a) 85 mm __________ 8.5 m
b) 28 mm __________ 0.28 m
c) 39 cm __________ 3900 m
d) 2000 mm __________ 2 m
e) 8 mm __________ 0.8 cm

SUMMARY:

1. After completing the summary in FM 1 p. 76 develop the following chart to be used as a visual aid in the classroom.

To Change From Smaller to Larger Units

millimeters (mm) to centimeters (cm) - divide by 10
centimeters (cm) to meters (m) - divide by 100
millimeters (mm) to meters (m) - divide by 1000

2. Fill in the blanks below with the correct answers:

a) Millimeters can be changed to __________ by dividing by 10.
b) Centimeters can be changed to __________ by dividing by 100.
c) Millimeters can be changed to meters by dividing by __________.
d) Smaller units of linear measure can be changed to larger units by __________ by powers of ten(10).

CALCULATOR APPLICATION FOR TOPIC 5

1) In the previous topic, the concept of multiplying whole and decimal numbers by the powers of ten was covered. A major concept of this topic is the division of whole and decimal numbers by the powers of ten. It is now essential for the students to grasp the concept that this computational process requires movement of the decimal point towards the LEFT, thus decreasing the value of the number being divided. This concept is introduced in Development #2 in FM 1, pg. 75, as well as adapted application A.

2) It is important to remember that all divisors will be whole numbers in the powers of ten (10,100,100), as the metric units of linear measurement are all based on the powers of ten.

3) The first application of this concept is dividing any whole number by 10. The students should understand that decimal point moves one space to the left, - i.e. 7. ÷ 10 = $\underset{\curvearrowleft}{.7.}$ = .7. They are then taught that dividing a number by 100 will move the decimal place two places to the left, - i.e. 7. ÷ 100 = .07, and so on.

4) The teacher should review, with the students, the actual physical steps used to enter an arithmetic problem into the calculator,

i.e. - "7. ÷ 100 = "should be entered as;

A. The number 7,
B. the decimal point,
C. the division (÷) sign
D. the number 1,
E. the number zero,
F. the number zero and
G. the equals (=) sign.

The answer 0.7 will be displayed on the calculator.

5. An interesting application would be to have the students divide any number by 10, record the answer, divide the answer by 10, record that answer, divide that answer by 10, record the answer, etc. The students, by observing the series of answers, may see the movement of the decimal point to the left, the decrease in value for each space moved to the left, and might grasp the concept that the decimal point moves to the left for every increase in the power of ten exponent, or for every additional zero in the divisor. Illustrate this application on the chalkboard, i.e.

a. 7. ÷ 10 = .7
b. .7 ÷ 10 = .07, or (.7 ÷ 10) ÷ 10 = .07
c. .07 ÷ 10 = .007, or (.7 ÷ 10) ÷ 10 ÷ 10 = .007, etc.

6) It is important to have the students use the calculator to check their own self-calculated answers only.

SUGGESTED TEST ITEMS FOR TOPIC 5

Name ______________________________

1) Compute the following divisions:

a) 47 ÷ 10 (4.7)

b) $\frac{8450}{1000}$ (8.45)

c) 16.2 ÷ 100 (.162)

f) .29 ÷ 10 = (.029)

g) 1000 ÷ 3.286 (.003286)

2) Change each of the following measurements to the indicated unit:

a) 43cm(.43) m

b) 4mm (.4) cm

c) 3.8cm (.038)m

d) 325mm (.325)m

e) 10cm (100)mm

f) 6275m (6,275,000) mm

g) 86mm (8.6) cm

3. Place the correct symbol <, =, or > between each pair of measurements

a) 45mm 4.5cm

b) 8000mm 8m

c) 46mm 0.46m

d) 38cm 3800m

e) 2000mm 20cm

Topic Six

THEME: To learn how to compare and convert meters and kilometers

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state that a kilometer is a smaller unit of measurement than a mile.
- convert kilometers to meters (multiply by 1000)
- convert meters to kilometers (divide by 1000)

ADAPTATIONS FOR LESSON 6 FM 1 pgs. 77-78

ADAPTED CHALLENGE PROBLEM: New car speedometers have two sets of numbers on the face of the dial. Why do the numbers 80 and 50 appear at the same point on the dial?

DEVELOPMENT:

A. Discuss the adapted challenge problem. Elicit from class that the 50, represents 50 miles per hour and that the 80 represents 80 kilometers per hour. Explain that kilometers are smaller units of measurement than miles, therefore it takes more kilometers than miles to cover the same distance. (Conversions from metric to English units will not be done in this course.)

B. Refer to the meter as a unit of measurement to measure distance, but that for long distances we use "kilometer" - (abbreviation km) which is equal to 1,000 meters.

C. In development #3 FM 1 p. 77 show the relationship between kilometers and meters and in addition the relationship between meters and kilometers as follows;

100m=0.1km
200m=0.2km
300m=0.3km

E. Do developments 4,5,6 in FM 1 pg. 78

NOTE: In development #5 in FM 1 pg. 78, illustrate that when dividing a number by 1000, move the decimal point three places to the left.

SUGGESTED TEST ITEMS FOR TOPIC 6

1) Change each of the following distance to meters:

   a) 8 km (8000)m

   b) 14 km (14000)m

   c) 245 km (245000)m

   d) 38.2 km (38,200)m

2. Change each of the following distances to kilometers

   a) 3000m (3 km)

   b) 48,000m (48 km)

   c) 7m (.007 km)

   d) 350m (.35 km)

Solve the following problems:

1. John walks 2.3 km from home to school each day. How many meters is this?

   ______(2300)______

2. One of the races in the Olympic Games is 8,000 m in length. How many kilometers is this race? __(8)__

Topic Seven

THEME 1: To learn how to convert fractional numbers to decimal numbers.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- express a verbal relationship as a fraction.
- state that common fractions are not generally used in the metric system.
- change a fractional number to a decimal number.

ADAPTED VOCABULARY:

Additional Review: fraction, numerator, denominator.

ADAPTATIONS FOR LESSON 1 IN FM 1 pgs. 79-80.

ADAPTED CHALLENGE PROBLEM: A carpenter wishes to cut a meter board into four equal parts. How long will each of these parts be?

DEVELOPMENT:

A) Discuss the challenge problem. Elicit from the students that the answer can be expressed as the fraction $\frac{1m}{4}$. Ask the question "Why is the answer $\frac{1m}{4}$ not a suitable answer for the carpenter to use?" Elicit that the metric system of measurement is based on the powers of ten, and that metric measurements are expressed as whole and decimal numbers. Now ask "How could we express $\frac{1m}{4}$ into a decimal number?"

B) Demonstrate the method of converting a fraction to a decimal number? i.e., $\frac{1}{4} = 1 \div 4 = 4\overline{)1.}$ Dividing the numerator by the denominator will express the answer as a decimal number. (The fraction line means to divide by).

NOTE: The students may feel uncomfortable dividing a larger number into a smaller number. You must review the concept that a decimal point can be placed after the right-most digit in a whole number, and that zeroes might be placed after the decimal point as "place holders." Thus, $1 \div 4 = 1.00 \div 4$. The answer may now be computed easily.

C) Returning to the challenge problem, ask the students "If the carpenter wants to cut that one meter board into 8 equal parts, how long would each piece be? Express your answer as a decimal number."

The students should compute as follows:

1. Each piece is $\frac{1m}{8}$ long.
2. $8\overline{)1.0} = .125$
3. Therefore, $\frac{1}{8} = .125m$

D) Do Application A in FM 1, pg 80.

SUMMARY:

1. Review the method of changing fractions into decimal numbers.
2. Provide many additional applications, using fractions where the denominator is either a factor of 2 or 5 only.

NOTE: The fractional numbers used in this theme are converted into terminating decimals. When the repeating digit in a decimal is zero, the decimal is called a terminating decimal. The decimal representation of a fraction will terminate if the only factors of the denominator are powers of 2 and/or powers of 5. Thus fractions with denominator such as, 2,4,8,10,20,etc... will terminate.

CALCULATOR APPLICATION FOR TOPIC 7, THEME #1

1. Earlier in this unit, the concept that any decimal may be written as a fraction, and vice versa, was introduced. During that theme, the students were instructed on the methods of conversion. In all instances, the denominators of the fractions being converted were powers of ten. This was done in order to coincide with the metric system of measurement, which is also based on the powers of ten.

2. In this topic we again deal with the direct relationship between fractions and decimal numbers. A major difference here is that the fractions are not solely based on the powers of ten, but deal with fractions whose denominators may also be factors of 2 (2,4,8,16,etc) and factors of 5 (5,25,etc). This was done so that the students would always deal with fractions that are terminating decimals.

3. Again, review both the method of converting fractions to decimals by dividing the numerator by the denominator, the meaning of a fraction, and the correct method of entering the information into a calculator to solve an arithmetic problem.

4. The teacher should walk the students through an example to demonstrate the correct use of the calculator.

   i.e. $\frac{5}{8}$ should be entered as; a. the numeral 5, b. the divison (÷) sign, c. the numeral 8 and d. the equals = sign. The answer, "0.625" will be displayed. Illustrate on the chalkboard;

   $\frac{5}{8} = 5 \div 8 = 0.625$, so that $\frac{5}{8} = 0.625$

5. An interesting application would be to illustrate to the students that there are certain fractions and decimals whose values are endless; calculator use of $\frac{1}{3}$ will display "0.333333" for as far as the display will show. Have the students perform the math computation.

   $\frac{1}{3} = 3\overline{)1.000}$

Explain that 1 will always be left over

Thus, there is no end for this decimal number representing $\frac{1}{3}$.

NOTE: This is not an objective for this lesson, but can be pointed out on the calculator as a motivational device.

6. It is important that the students use the calculator to check their own self-calculated answers, only.

Topic Seven

THEME 2: To review the conversion of any metric unit of linear measure to any other metric unit of linear measure.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- convert millimeters to centimeters or meters.
- convert centimeters to meters.
- convert meters to kilometers.
- convert kilometers to meters.
- convert meters to centimeters or millimeters.
- convert centimeters to millimeters.

ADAPTATIONS FOR LESSON 7 in FM 1 pgs. 79-80

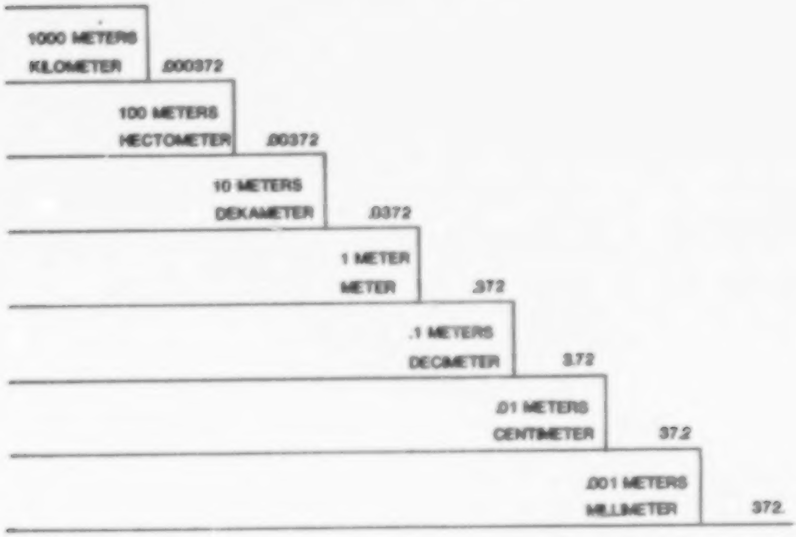
ADAPTED CHALLENGE PROBLEM: "The carpenter cut the meter board into 8 equal parts. We learned that $\frac{1m}{8} = .125m$. How many centimeters and millimeters are there in each piece?"

DEVELOPMENT:

A) Discuss the challenge problem. Review the metric system of linear measurement. Include a discussion on:

1. the powers of ten.
2. multiplying whole numbers and decimal numbers by the powers of ten.
3. dividing whole numbers and decimal numbers by the powers of ten.
4. changing fractions into decimals.
5. comparison of each metric unit of linear measurement to the other metric units.

B) The following visual aid chart should be displayed in the classroom:


1000 METERS
KILOMETER
.000372
100 METERS
HECTOMETER
.00372
10 METERS
DEKAMETER
.0372
1 METER
METER
.372
.1 METERS
DECIMETER
3.72
.01 METERS
CENTIMETER
37.2
.001 METERS
MILLIMETER
372.

THE FURTHER UP THE STEPS YOU GO, THE LONGER IS THE UNIT OF MEASURE.

THE FURTHER DOWN THE STEPS YOU GO, THE SHORTER IS THE UNIT OF MEASURE.

FOR EACH STEP UP THE STAIRS, THE DECIMAL POINT MOVES 1 PLACE TO THE LEFT.

FOR EACH STEP DOWN THE STAIRS, THE DECIMAL POINT MOVES 1 PLACE TO THE RIGHT.

C) DO APPLICATION B IN FM 1, p. 80

SUGGESTED TEST ITEMS FOR TOPIC 7

Name ______________________________

THEMES 1 and 2

1. Express each quotient as a decimal:

		Answers
a)	$\frac{22}{4}$	(5.5)
b)	$1 \div 5$	(.20)
c)	$\frac{5}{8}$	(.625)

2. Change each of the following lengths to the unit indicated:

   a) 8.25 km __________ m

   b) 52.4 cm__________mm

   c) 651 cm __________m

   d) 2563m__________km

3. Henry traveled 153 km in one day. How many meters did he travel?

4. Linda bought 352 cm of material for a costume. How many meters of cloth did she buy?

Topic Eight

THEME: To learn about the units to measure weight in the metric system.

ADAPTED PERFORMANCE OBJECTIVES:

- state that the gram is the basic unit of weight in the metric system.
- state that there are "about 30 grams to one ounce" (no conversions from one system to another are to be made).
- express the relationships among grams, milligrams, and kilograms.
- compare the relative sizes of, and indicate appropriate uses for, the milligram, gram, and kilogram.

ADAPTATION FOR LESSON 8, FM 1 pgs. 81-82

DEVELOPMENT:

A) The following visual aid chart should be used, and displayed in the classroom as part of Development #3, in FM 1, pg. 82.

UNIT OF MEASUREMENT	SYMBOL	METRIC PREFIX	MEANING OF PREFIX	WEIGHT IN RELATION TO GRAMS	WEIGHT IN POWER OF TEN
1. KILOGRAM	kg	Kilo	One Thousand–1000	1000 Grams	10^3 x 1 Gram, or 10x10x10x1 Gram
2. GRAM	g	-	-	1 Gram	10^0 x 1 Gram or 1x1 Gram
3. MILLIGRAM	mg	Milli	.001, $\frac{1}{1000}$ One Thousandth of	.001 Gram	$\frac{1}{1000}$ x 1 Gram, or .001x1 Gram

B) After completion of Development #3, and Application #2 in FM 1, pg. 82 do Adapted Applications A and B.

APPLICATIONS:

A) Place the symbol <, = , >, between each pair of measurements to make the sentence true.

a) gram __________ milligram

b) kilogram __________ gram

c) milligram __________ kilogram

d) milligram __________ gram

e) gram ___________ kilogram

B) Next to each of the following write the unit that would probably be used for measuring its weight. Choose from, mg.g,kg.

a) Weight of a large bag of peaches __________

b) Weight of an ant __________

c) Weight of an elephant __________

d) Weight of quarter ___________

e) Weight of a basketball ___________

SUMMARY:

Add to the summary in FM 1, pg. 82

1. Arrange these units of weight in order from least to greatest:
kg,mg,g

2. Answer true or false to the following:

a) One gram is more than one ounce. __________

b) One kilogram is less than one ounce. ___________

c) Ten grams is less than one ounce. ___________

d) One gram is more than a kilogram. ___________

SUGGESTED TEST ITEMS FOR TOPIC 8

Name ____________________________

1. Place the symbol < , =, > between each pair of measures of weight to make the sentence true:

   a) milligram __________ gram

   b) kilogram __________ gram

   c) milligram __________ kilogram

   d) gram __________ milligram

   e) kilogram __________ milligram

2. Next to each of the following write the abbreviation for the unit that would probably be used for measuring its weight. Choose from mg,g,kg.

   a) weight of a box of cereal.

   b) weight of a horse.

   c) weight of a football.

   d) weight of a bug.

   e) weight of a postage stamp.

3. Answer the following problems:

   a) A bag of lollipops weighed 1000 grams. A bag of pretzels weighed 2 pounds. Which is greater? ____________

   b) A box of cookies said, "Net Weight 100 grams." Is this more or less than a pound? ___________

   c) The doctor ordered medicine that weighed 800 milligrams. Would a gram of this medicine weigh more or less than what the doctor ordered?

4. Arrange in order, from least to greatest.

   gram
   kilogram
   milligram

5. TRUE OR FALSE?

   a) One ounce is more than one gram? ___________
   b) One pound is more than one kilogram? __________

Topic Nine

THEME: To learn about the relationship between the gram and the kilogram.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state the methods used for multiplying whole and decimal numbers by the powers of ten.
- state the method used for dividing whole numbers and decimal numbers by the powers of ten.
- apply the rule for converting grams to kilograms.
- apply the rule for converting kilograms to grams.

VOCABULARY ADAPTATIONS:

Additional Review Terms: the powers of ten, place holder

ADAPTATIONS FOR LESSON 9, FM 1 pg. 83

A. In Development #2, in FM 1, pg 83 illustrate the relationship between kilograms and grams. In addition, develop the relationship between grams and kilograms, as follows:

100g=0.1kg

200g=0.2kg etc,

900g=0.9kg

1,000g=1.0kg

B. In Development #3, FM 1, pg. 83, it would be helpful to review with the students the methods of multiplying and dividing whole and decimal number by the powers of ten, and methods of converting units of measure.

Elicit that:

1) When converting from larger units of measure to smaller units use the operation of multiplication.

2) When multiplying whole and decimal numbers by the powers of ten move the decimal point to the right the same number of spaces as there are zeroes in the power of ten number.

3) When dividing whole and decimal numbers by the power of ten move the decimal point to the LEFT the same number of spaces as there are zeroes in the power of ten number.

C) With these rules re-established answer the challenge problem.

Illustrate on the chalkboard as follows;

How many grams are there in 1.6 kilograms?

1) There are 1,000 grams in every kilogram; 1,000 g=1kg

2) Since 1,000g=10^3g, or there are 3 zeroes in the power of ten number, move the decimal point 3 spaces to the right. Thus, 1.6 kg x 1,000-1.$\underset{\curvearrowright}{600}$.=1,600g.

NOTE: Review the concept of adding zeroes as "place holders" between the right most digit and the new position of the decimal point.

3) Therefore, 1.650kg=1,650g

D) DO ADAPTED APPLICATIONS #1,2,3 and 4, and APPLICATION #1 and 2 in FM 1, pg. 84.

SUMMARY:

1. Compare conversions between grams and kilograms with conversion between meters and kilometers. Refer to the chart, prepared for linear measure.

2. Complete the following sentences:

   1. If you were weighing vegetables bought in a store and were using the metric units of weight, what unit would you use? __________.

   2. If you were weighing yourself what metric unit of weight would you use?
   ____

   3. Which is heavier, a pound or a kilogram? __________.

   4. Kilograms can be converted to grams by __________ the number of kilograms by 1,000.

APPLICATIONS:

1. Convert each of the following weights to grams:

   a) 11 kg

   b) 32 kg

   c) 4.5 kg

   d) 0.679 kg

2. Convert each of the following weights to kilograms:

   a) 5000g

   b) 400g

   c) 28,500g

   d) 7g

3. A student weighed 64.3 kg. How many grams is this?

4. A book weighed 1,850g. What is its weight in kilograms?

SUGGESTED TEST ITEMS FOR TOPIC 9

Name ______________________

1) Change each of the following weights to grams:

   a) 14 kg

   b) 350 kg

   c) 8.35 kg

   d) 0.9 kg

2) Change each of the following weights to kilograms:

   a) 4000g

   b) 37,000g

   c) 8g

   d) 70g

3) A student on the basketball team weighed 87 kg. What is his weight in grams?

4) A jar of jelly weighed 2150 grams. How many kilograms is this weight?

Topic Ten

THEME: To learn about the relationship between the gram and the milligram.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state the rules for multiplying and dividing whole and decimal numbers by the powers of ten.
- apply the rule for converting grams to milligrams.
- apply the rule for converting milligrams to grams.

VOCABULARY ADAPTATIONS:

Additional Review terms: powers of ten, place holder

ADAPTATIONS FOR LESSON 10, FM 1, pgs. 85-86

DEVELOPMENT:

A) In Development #2, in FM 1, pg. 85 illustrate the relationship between the milligram and the gram in addition to the relationship between the gram and the milligram, as follows;

100mg=-0.1g
200mg=0.2g
900mg=0.9g
1,000mg=1.0g

B) In Development #3 in FM 1, pg. 85 review:

1. The methods of multiplying and dividing whole and decimal numbers by the powers of ten.
2. The methods of converting units of measure.
3. The method for changing fractions into decimal numbers.

C) Do Development #3 on FM 1, pg. 85.

D) Illustrate the methods of converting grams to milligrams and milligrams to grams, on the chalkboard;

i.e.

1) How many milligrams are there in 2.3 grams?

Solution;

1. There are 1,000 milligrams in every gram, so that 1,000 mg=1g.

2. Convert grams to milligrams by multiplying, so that 2.3 x 1,000 = ? mg.

3. When multiplying by a power of ten move the decimal point to the right the same number of spaces as in the power of ten number. 1,000 has 3 zeroes so move the decimal point three spaces to the right: 2.3 x 1,000=$2.\underbrace{300}.$=2,300mg

4. Answer: 2.3=2,300mg

2) How many grams are there in 865 milligrams?

Solution:

1. 1g=1,000mg

2. We convert milligrams to grams by dividing, so that 865-1,000=?g

3. When dividing by a power of ten, move the decimal point to the left the same number of spaces as there are zeroes in the power of ten numbers, so that 1,000 has 3 zeroes- move decimal point 3 spaces to the left.

   i.e. 865 mg ÷ 1,000 = $.\underbrace{865}.$ = .856 g

4. Answer; 865 mg=.865g

ADAPTED APPLICATIONS:

1) Change each of the following weights to grams:

   a) 3000mg
   b) 275mg
   c) 6mg
   d) 80,000mg

2) Change each of the following weights to milligrams:

   a) 9g
   b) 57g
   c) 0.374g
   d) 35.82g

SUMMARY:

A. Answer the following questions:

   1. Which is heavier, a gram or an ounce? ____________

   2. We can convert grams to milligrams by _________ the number of grams by 1,000.

3. If you were weighing the amount of medicine in a tablet, or pill, what metric unit of weight would you use? __________

4. _____________ milligrams=1 gram= _______________kilograms.

B. Compare the conversions between grams and milligrams to the conversions between meters and millimeters. Refer to the chart prepared for linear measure.

C. Add to the visual aid "steps" chart, the terms KILOGRAM on the KILOMETER step, GRAM on the METER step, and MILLIGRAM on the MILLIMETER step. This would concretize the concepts of the metric prefixes and the comparative sizes of the units of the linear and weight measurement.

SUGGESTED TEST ITEMS FOR TOPIC 10

Name ____________________________

1. Change each of the following weights to grams:

   a) 500 mg

   b) 355 mg

   c) 482.5 mg

   d) 60,000 mg

2. Change each of the following weights to milligrams:

   a) 37g

   b) 325g

   c) 44.6g

   d) 17.98g

3. Ann mailed a letter that weighed 40 grams. What would the letter weigh in milligrams?

4. A large paper clip weighs about 2000 milligrams. How much does the clip weigh in grams?

UNIT IV — GEOMETRY

INTRODUCTION

Many major geometric concepts are introduced in Unit IV. Many of these concepts will include vocabulary with which the student is unfamiliar. The teacher must make every effort to make the students comfortable with these new terms and to provide constant reinforcement. Geometry is a very visual subject and it is strongly suggested that visual aids be used extensively.

In organizing this unit it was intended that the teacher continually reinforce the skills developed in previous units. The teacher should reinforce addition and subtraction of whole numbers and mixed numbers in lessons involving the sum of the measures of the angles of a triangle. Measurements of line segments can be reinforced throughout the unit.

Addition and multiplication of decimals and multiplication of fractions and mixed numbers are introduced in the context of geometric applications. Suitable emphasis on the computational skills must be maintained.

One change in the sequence of the lessons takes place in this unit. The material covered in FM 7 Lesson 9 will be taught after the material contained in Lessons 10 and 11. There have been no adaptations made for topic 14.

Topic One

THEME: To learn how to identify triangles and describe them according to the lengths of their sides.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- use markings on the sides of a triangle to show equality or inequality of the sides.
- illustrate the importance of geometric shapes by referring to their uses in architecture and elsewhere.
- state the definition of triangle.
- divide the set of triangles into three groups: scalene, isosceles, and equilateral, relating the classification to the number of equal sides.

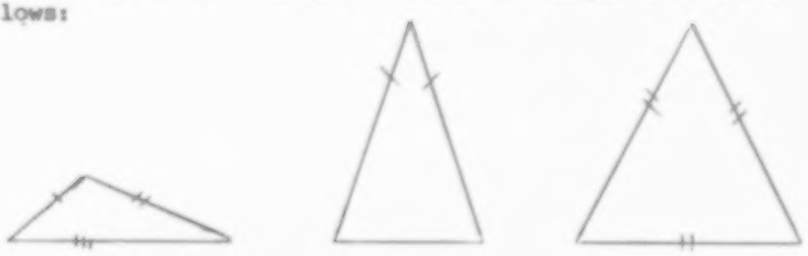
VOCABULARY ADAPTATIONS:

New Terms: geometric figure

ADAPTATIONS FOR LESSON 1, FM 1, pp. 89-91

DEVELOPMENT:

A. After Development 4 in FM 1 (p. 90), develop the use of markings on the sides of the three triangles used in Development 2, FM 1, (p.89), as follows:



a) When the markings are different on all three sides, it means that each side has a different length.
b) When the markings are the same on two of the three sides, it means that two of the three sides are equal in length.
c) When the markings are the same on all three sides it means that all the sides are equal.

NOTE: Inform students that the markings may be one or more lines. When the markings are the same it shows equality and when they are different it shows inequality.

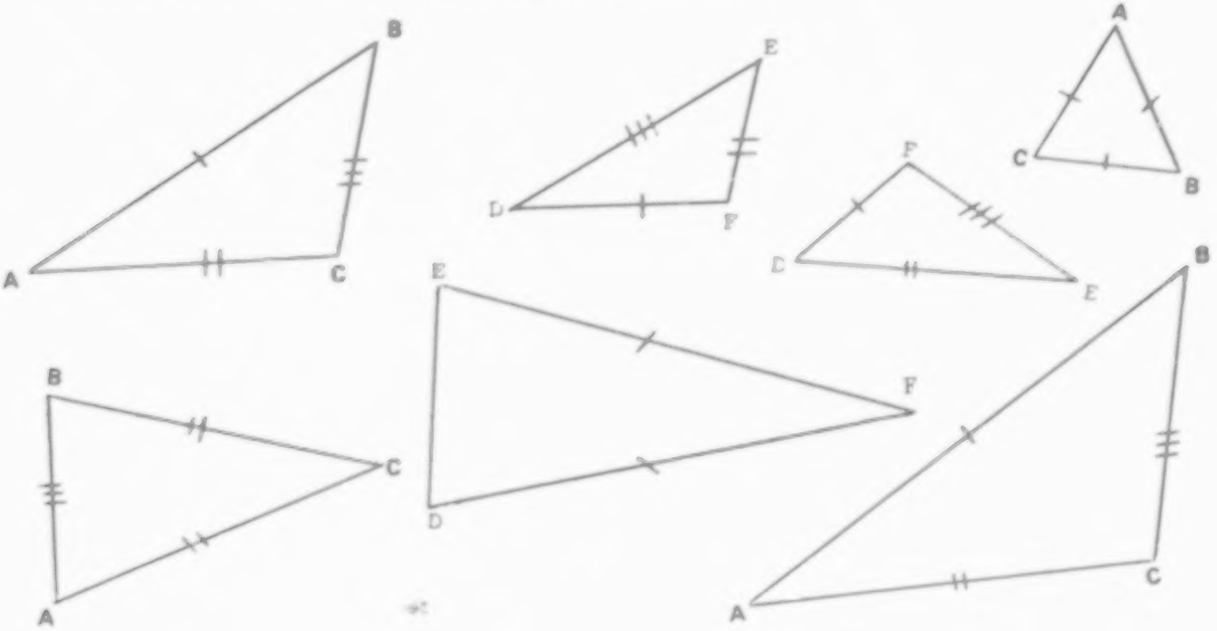
B. Do adapted application 1 and 2 and then proceed to application A-C, FM 1, (p. 90).

C. A test on this topic is not necessary.

NOTE: It is suggested that a chart showing a scalene, isosceles, and equilateral triangle be displayed in the room as a visual aid for the students.

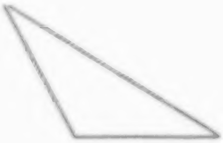
ADAPTED APPLICATIONS

1. Name any equal line segments in each figure and state whether each triangle is scalene, isosceles, or equilateral.

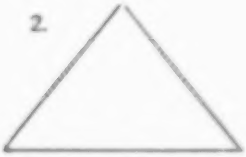


2. Classify, (name the type of) each triangle below according to the lengths of its sides.

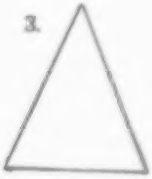
1.



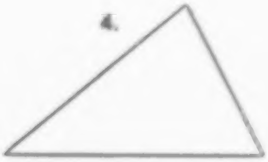
2.



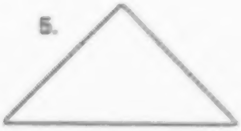
3.



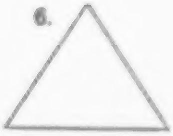
4.



5.



6.



Topic Two

THEME 1: To learn how to name angles.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state how an angle is formed.
- use the symbol "∠" or "∡" for the word angle.
- state how an angle is named.

VOCABULARY ADAPTATIONS:

New Terms:	vertex, ray
Review Terms:	line segment, infinite, geometric figure
Terms Deleted:	degree, acute, obtuse, right, straight, protractor

ADAPTATIONS FOR LESSON 2, FM 1, pp. 92-94.

CHALLENGE PROBLEM:

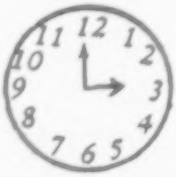
What geometric figure is formed by the hands of a clock?

DEVELOPMENT:

A. Discuss challenge problem. Elicit from students that the hands of a clock form an angle.

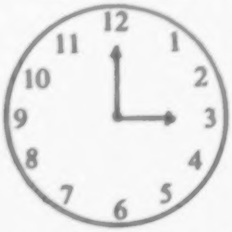
B. State how an angle is formed as follows:

1. Show a clock



2. Note that the hands of the clock have the same endpoint -- this endpoint is called the vertex.

3. Draw a larger clock denoting the same time as in previous illustration.



4. Discuss the fact that the point where the hands meet is still called the vertex. Elicit that the hands in the second drawing are larger than the hands in the first drawing. The length of the hands does not change the angle.

5. Define a ray as a line-figure that starts at one point and extends infinitely in one direction.

6. Define angle as a geometric figure formed by two different rays having the same endpoint. The rays are called the sides of the angle and the endpoint is called the vertex.

C. The symbol for the word angle can be written as "<" or "∡".

NOTE: The symbol < should not be confused the less than symbol <. Use the angle symbol with arc ∡ to avoid confusion.

D. There are several ways of naming angles. Discuss these ways using the following diagrams:

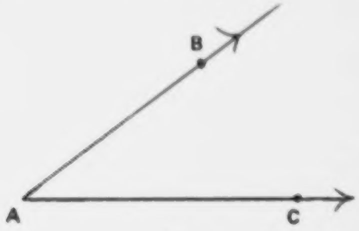


figure 1

1. Choose one point on each ray and name it by a capital letter, e.g., B, C.

2. Name the vertex by a capital letter, e.g., A.

3. The angle is named by tracing along the path of the angle from one point to the vertex to the other point.

4. Therefore the angle is named ∡ BAC or ∡ CAB.

5. Stress that the vertex is always the middle letter of the three named letters.

6. Use figure 1 to illustrate that there is no ∡ ABC because these letters do not trace an angle.

7. Refer to figure 1 and inform students that the angle may also be called ∡ A, thereby naming the angle by the letter of the vertex. This method of naming an angle may only be used if one angle is formed with that vertex.

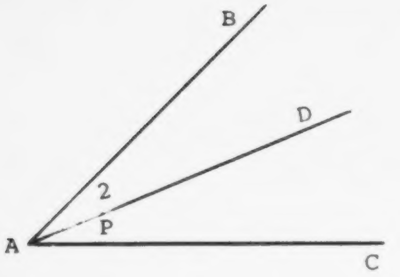


figure 2

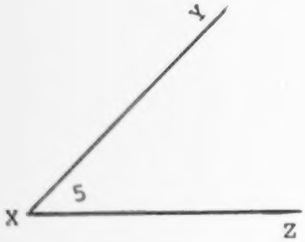
8. In figure 2, we have formed three angles with the same vertex. How can we name them (answers: ∡ BAC, ∡ BAD, ∡ DAC)? Therefore naming an angle as ∡A would cause confusion. Another way of naming these angles would be to use lower case letters or numbers inside the angle as illustrated in figure 2. Thus ∡ BAD could be called ∡ 2, and DAC could be called ∡ p.

E. Do Application A in FM 1 (p. 94).

F. Do adapted application 1, 2, and 3.

SUMMARY:

1. Name the angle in the following illustration in four different ways.



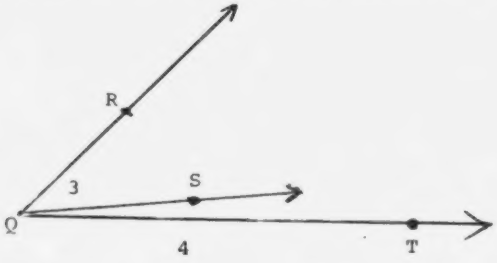
Answers
(∡ YXZ)
(∡ ZXY)
(∡ X)
(∡ 5)

2. The common endpoint of the rays is called the ________________ of the angle. (vertex)

3. An angle is formed by two different ______________________ having the same endpoint. (rays)

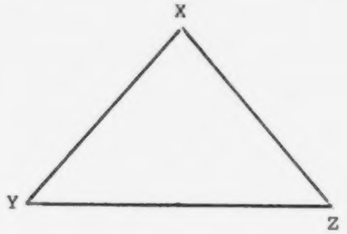
ADAPTED APPLICATIONS:

1. Name all of the angles on the diagram by letter and number.



Answers:
a) ∡ RQS
b) ∡ 3
c) ∡ RQT
d) ∡ SQT
e) ∡ 4

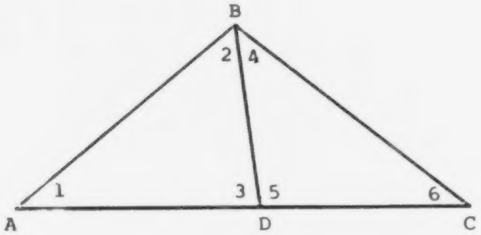
2. Name all of the angles in the following triangle.



Answers:

a) ∡ XYZ, or ZYX
b) ∡ XZY, or YZX
c) ∡ YXZ, or ZXY

3. Give the three-letter name for each of the numbered angles.



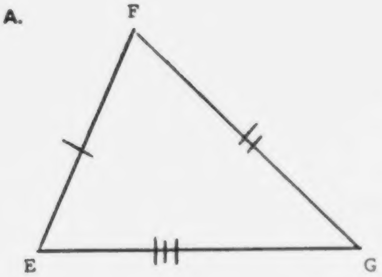
Answers:
a) ∡1 = ∡(BAD, or DAB)
b) ∡2 = ∡(ABD, or DBA)
c) ∡3 = ∡(ADB, or BDA)
d) ∡4 = ∡(CBD, or DBC)
e) ∡5 = ∡(BDC, or CDB)
f) ∡6 = ∡(BCD, or DCB)

SUGGESTED TEST FOR TOPIC 1 AND TOPIC 2 -- THEME 1

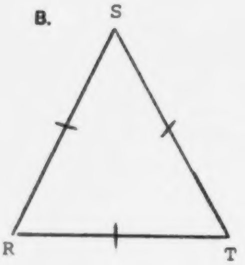
NAME: ______________________

1. Name any equal line segments in each figure and state the kind of triangle.

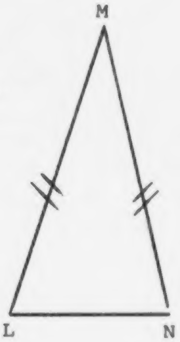
A.



B.



C.



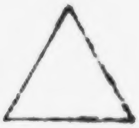
Answers: ((a) none; scalene triangle)

((b) $\overline{SR}$, $\overline{ST}$ and $\overline{RT}$; equilateral triangle)

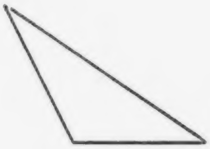
((c) $\overline{LM}$ and $\overline{NM}$; isosceles triangle)

2. State the names of the triangles in the following illustration according to the lengths of their sides.

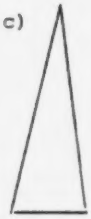
a)



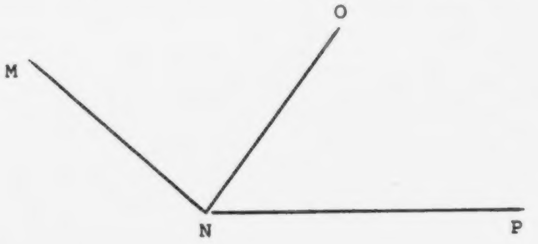
b)



c)

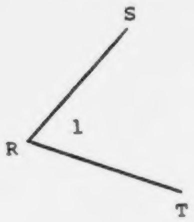


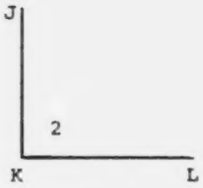
3. Name all the angles in the diagram by letter.

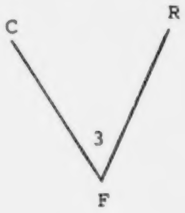


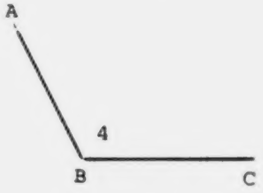
Answers: (a) ∡ MNO or ∡ ONM)
(b) ∡ MNP or ∡ PNM)
(c) ∡ ONP or ∡ PNO)

4. Name the sides and the vertex of each of the angles shown.









Answers:

(∢1
vertex = R
sides =
$\overline{SR}$ ($\overline{RS}$) and $\overline{RT}$ ($\overline{TR}$))

(∢2
vertex = K
sides =
$\overline{JK}$ ($\overline{KJ}$) and $\overline{KL}$ ($\overline{LK}$))

(∢3
vertex = F
sides =
$\overline{CF}$ ($\overline{FC}$) and $\overline{FR}$ ($\overline{RF}$))

(∢4
vertex = B
sides =
$\overline{AB}$ ($\overline{BA}$) and $\overline{BC}$ ($\overline{CB}$))

Topic Two

THEME 2: To learn how to define angles by the number of degrees in an angle.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- describe an angle as a rotation (as the angle between the hands of a clock)
- state that one complete rotation is divided into 360 units called degrees.
- state the one-quarter of a rotation is a right angle (90°).
- state that one-half of a rotation is a straight angle (180°).
- state a definition for an acute angle, a right angle, an obtuse angle, and a straight angle.
- select by sight from given diagrams an acute, right, obtuse, and straight angle.

VOCABULARY ADAPTATIONS:

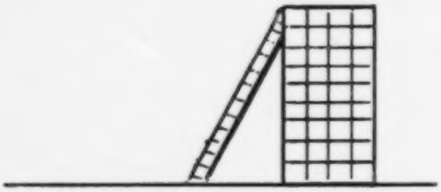
New Terms:	rotation, initial side, terminal side
Review Terms:	angle, vertex, ray
Term Deleted:	protractor

ADAPTATIONS FOR LESSON 2, FM 1, pp. 92-94

CHALLENGE PROBLEM: Use problem in FM 1 (p. 92).

DEVELOPMENT:

A. Discuss the challenge problem. Illustrate the ladder against the building on the chalkboard.

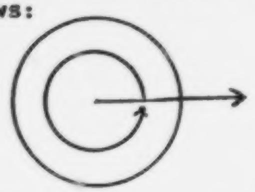


B. State that the degree is a unit of measure for angles. Show that the symbol for degrees in "°"; 70 degrees = 70°.

C. It is important to stress that the size or measure of an angle depends on the rotation or movement of the ray, not on the length of the ray, or sides. (The sides of an angle may be extended infinitely.)

NOTE: Use a manipulative device for a "hands-on" approach to demonstrate how an angle is formed, how a side is rotated, and how to classify angles. To construct such a device the teacher should connect two cardboard strips (rays) with a paper fastener. Keeping one side fixed, rotate the other ray to show how angles are formed and changed by rotation.

D. State to class that when one of the two rays forming an angle rotates or moves from its initial position about its fixed endpoint until it returns to its original position, this is a complete rotation. A complete rotation is defined as 360°. Illustrate with the manipulative device and on the chalkboard as follows:



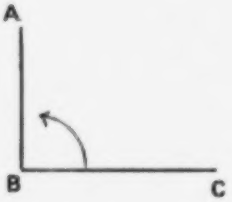
E. Complete Developments 1 and 2 in FM 1 (pp. 92-93).

F. Add the following to Development 3 in FM 1, (p. 93).

Angles are classified according to the amount of rotation, or according to the number of degrees in the angle formed by that rotation.

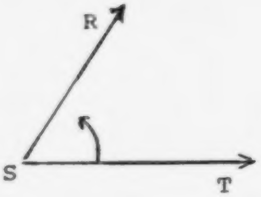
Classifications:

1. Right angles (example)



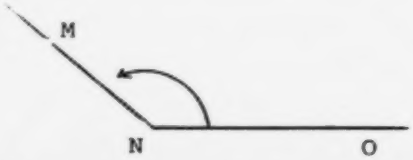
A right angle is an angle whose measure is always 90°. A right angle is one-quarter of a complete rotation. Since a complete rotation is 360°, one-quarter of 360° is 90°.

2. Acute angles (example)



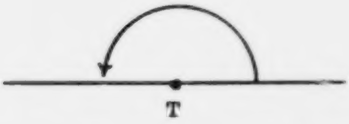
Any angle that is less than one-quarter of a complete rotation, or less than 90°, is called an acute angle.

3. Obtuse angles (example)



Any angle that is more than one-quarter of a complete rotation, or more than 90°, but less than one-half of a complete rotation, is an obtuse angle.

4. Straight angles (example)



A straight angle is an angle whose measure is 180°. A straight angle is one-half of a complete rotation and since 360° is a complete rotation and one-half of 360° is 180°, a straight angle contains 180°.

G. Do Application B in FM 1 (p. 94), and Adapted Applications 1 and 2.

NOTE: No test will be included at the completion of this theme.

SUMMARY: Answer the following questions:

1. A unit of measure for angles is called a ____________________. (degree)

2. One complete rotation is ____________________ degrees. (360)

3. One quarter of a rotation forms an angle called a ____________________ angle. (right)

4. An ____________________ angle is less than a right angle. (acute)

5. An ____________________ angle is more than a right angle and less than a straight angle. (obtuse angle)

6. A right angle contains ____________________ degrees. (90°)

7. A ____________________ angle is one-half of a rotation. (straight)

8. One-half of a rotation is ____________________ degrees. (180°)

9. The ____________________ of an angle is the amount of rotation of a ray from its initial side to its terminal side. (measure)

ADAPTED APPLICATIONS:

1. Label the following as acute, right, obtuse, or straight angles. The angles formed by the hands of a clock when it is:

   a) 3 o'clock ____________________ (right angle)

   b) 12:10 ____________________ (acute angle)

   c) 6:00 o'clock ____________________ (straight angle)

   d) 9:00 o'clock ____________________ (right angle)

   e) 7:00 o'clock ____________________ (obtuse angle)

2. State whether the following angles are acute, right, obtuse, or straight angles:

   a) $\measuredangle 2 = 150^{\circ}$

   b) $\measuredangle B = 90^{\circ}$

   c) $\measuredangle R = 43^{\circ}$

   d) $\measuredangle M = 89^{\circ}$

   e) $\measuredangle T = 176^{\circ}$

Topic Two

THEME 3: To learn how to measure the size of an angle.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state what a protractor is used for and how it is used.
- use a protractor correctly to measure angles.
- measure angles and classify them as acute, right, obtuse, or straight angles.
- use a protractor to draw angles of various sizes.

VOCABULARY ADAPTATIONS:

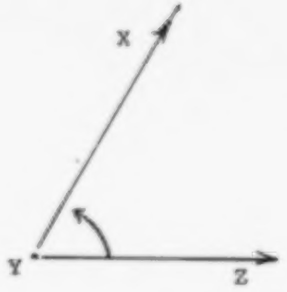
New Term:	protractor
Review Terms:	angle, acute, obtuse, right angle, straight angle, vertex, ray, initial side, terminating side, line segment

ADAPTATIONS FOR LESSON 2, FM 1, pp. 92-94

CHALLENGE PROBLEM: Draw the following angle on the chalkboard or on a rexographed sheet.

A. Ask the students:
"How large is this angle?"

B. Elicit student estimates.

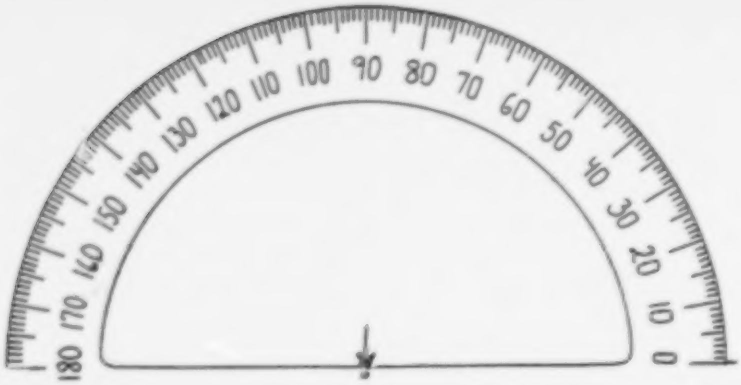


DEVELOPMENT:

A. Discuss the challenge problem. After eliciting a variety of student estimates as to the size of the angle, ask the students, "How can we determine which student's answer is correct?" Elicit that we need a tool to measure the number of degrees in the rotation from the initial side (ray $\overrightarrow{YZ}$) to the terminal side (ray $\overrightarrow{YX}$). Ask the students, "How can we measure the number of degrees in $\measuredangle Y$?"

B. Introduce the protractor to the class.

NOTE: It is suggested that photocopies of the protractor below be backed with cardboard and distributed to the class for a "hands-on" experience for the development of this theme.



C. Explain that the protractor is a measuring device used to measure the number of degrees in an angle. Ask the students what geometric figure the protractor resembles. Attempt to elicit that it appears to be a semi-circle. Review that one complete rotation, in the form of a circle is equal to 360°. The protractor, as one-half of a circle, contains 180°, since one-half of 360° = 180°.

D. Instruct the class in the proper use of the protractor. Demonstrate the method by measuring the angle on the chalkboard or rexograph sheet.

1. Place the protractor over the angle to be measured.
2. Place the dot on the protractor (the vertex) over the vertex of the angle; i.e., in this case on vertex Y.
3. Put the lower side, or bottom line of the protractor, along the initial side of the angle; i.e., in this case line segment $\overline{YZ}$.
4. Read the number where the terminal side, in this case line segment $\overline{YX}$, crosses the protractor.
5. Thus, the number of degrees in $\measuredangle Y = 60^\circ$.

NOTE: The students will be asked to measure angles only to the nearest 5°; i.e., 15°, 20°, 25°, 30°, etc.

6. The teacher should provide for many additional applications for this objective. This may be done by placing many angles on a rexographed sheet, and distributing them to the students for measurement, as suggested in Application C in FM 1 (p. 94), and Adapted Applications 1,2,3 and 4.

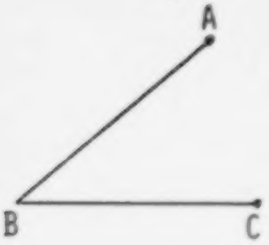
SUMMARY:

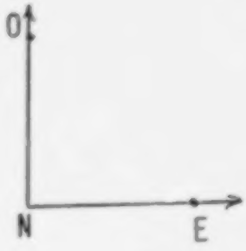
Use the Summary in FM 1, (p. 94).

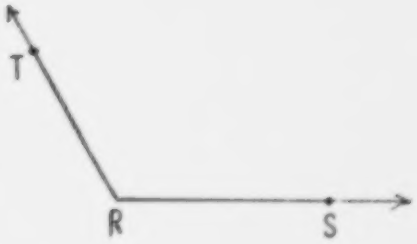
NOTE: A test for Topic 2, Themes 2 and 3, may be developed using the applications for both themes as a model.

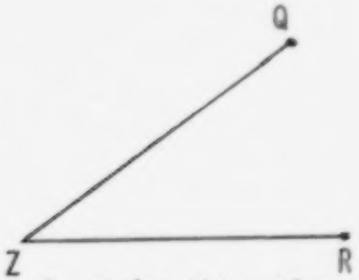
ADAPTED APPLICATIONS:

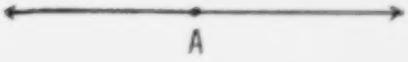
1. Use a protractor to find the number of degrees in each of the following angles:











2. Using the angles shown in 1, state the kind of angle named.

a) ∡ A ______________________________ (straight angle)

b) ∡ CBA ______________________________ (acute angle)

c) ∡ ENO ______________________________ (right angle)

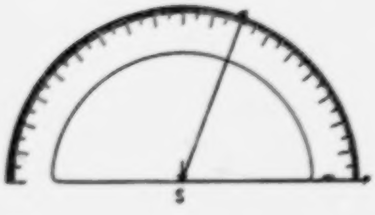
d) ∡ Z ______________________________ (acute angle)

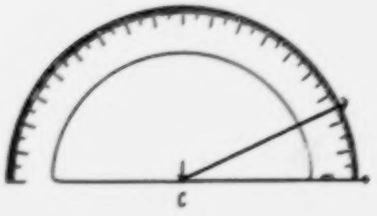
e) ∡ SRT ______________________________ (obtuse angle)

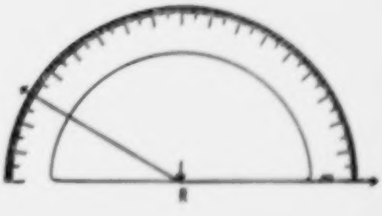
3. Use a protractor to draw angles of these sizes:

a) 45° b) 60° c) 150° d) 90° e) 180°

4. Estimate the size of the angles shown using the protractors given.







Topic Three

THEME: To learn how to find the sum of the angles of a triangle.

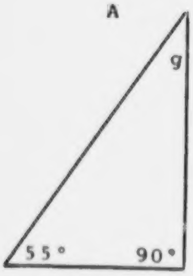
ADAPTED PERFORMANCE OBJECTIVES:

- state the relationship that the sum of the measures of the angles of a triangle is 180°.
- apply this relationship to find the measure of the third angle of a triangle when the measures of two angles are given.
- state that a triangle cannot include two right angles, two obtuse angles, or a right angle and an obtuse angle.

ADAPTED APPLICATIONS:

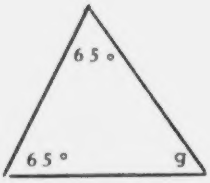
1. Find the measure of angle g in each of the following triangles:

A



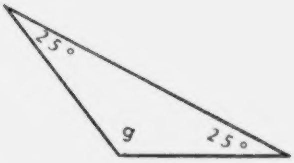
∡g=

B



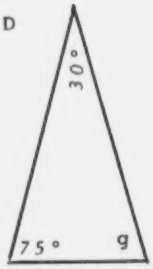
∡g=

C



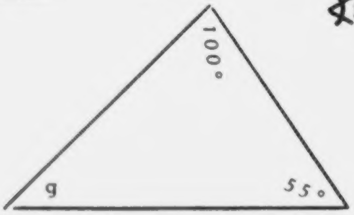
∡g=

D



∡g=

E



∡g=

2. After Development 5, FM 1 (p. 96), do the following application.

   Indicate whether the following statements are TRUE or FALSE.

   a) A triangle may have two obtuse angles.

   b) A triangle may have three acute angles.

   c) A triangle may not have two right angles.

   d) A triangle may have two acute angles.

NOTE: A test for this topic will be incorporated in the test to be given at the end of Topic 4.

CALCULATOR APPLICATION:

1. The students should use their calculators to check their own self-calculated answers in this theme.

2. Review the method for entering the correct information into the calculator.

3. Since the total degrees in a triangle equals 180°, to find a third angle when given two other angles, subract the other two angles from 180°. Thus enter as follows: "A triangle has one angle of 50° and one of 30°; what is the third angle?"

4. Enter:
   180, minus sign, 50, minus sign, 30, equal sign.
   The calculator should display the correct answer, 100.

5. Repeat the process to check other answers in this theme.

Topic Four

THEME 1: To learn how to classify triangles by the measure of their angles.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

. state when a triangle is acute, right, or obtuse.

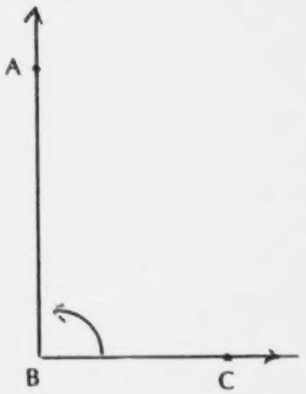
VOCABULARY ADAPTATIONS:

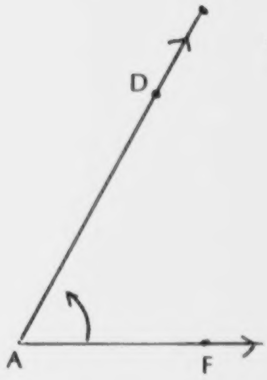
Review Terms:	acute angles, obtuse angles, right angles
Terms Deleted:	equiangular, leg, hypotenuse, base angles

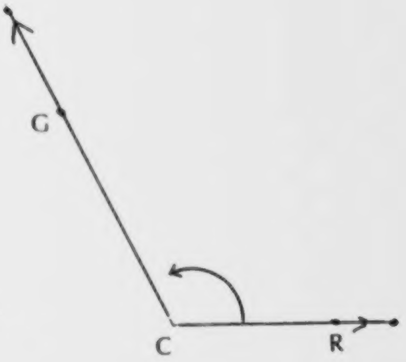
ADAPTATIONS FOR LESSON 4, FM 1, pp. 98-99

CHALLENGE PROBLEM:

Measure each angle and classify the angle as acute, right, obtuse, or straight.







DEVELOPMENT:

A. Discuss challenge problem. Elicit answers from students that:

∢ A is acute
∢ B is right
∢ C is obtuse

B. Draw a line connecting the points indicated on each side of the angle to form a triangle.

C. Ask students:

1. "What classification could you give to these triangles according to the measures of their angles?"

2. "What determines the angle classification of each triangle?" (See G 1 and 2 for answers.)

D. Elicit the following responses from students:

△DAF is an acute triangle
△ABC is a right triangle
△GCR is an obtuse triangle

NOTE: We name the triangle by naming the vertices of the angles which form the triangle in any order. Thus △ BAC, △ BCA, △ CAB, etc., all name the same triangle.

E. Do Application A in FM 1 (p. 99), and Adapted Application 1.

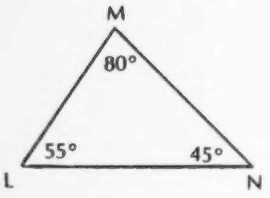
F. Develop the following concepts:

1. You can find the type of triangle by measuring its angles.

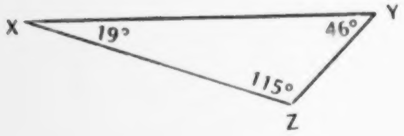
2. A triangle can be classified by finding the measurement of the largest angle and determining what kind of angle it is (acute, right, or obtuse).

Examples:

illus.



∢M is the largest angle.
∢M is acute.
Therefore △LMN is an acute triangle.



∢Z is the largest angle.
∢Z is obtuse
Therefore △XYZ is an obtuse triangle

H. Do Adapted Application 2.

SUMMARY:

Fill in the blanks below:

1. If a triangle has one right angle and two acute angles, it is a (an) ________________ triangle. (right)

2. If a triangle has three acute angles, it is an (a)_____________ triangle. (acute)

3. If a triangle has two acute angles and one obtuse angle, it is an (a) ________________ triangle. (obtuse)

4. You can classify a triangle according to its sides or its ______________. (angles)

NOTE: A test for this topic will be incorporated at the end of Theme 2, Topic 4.

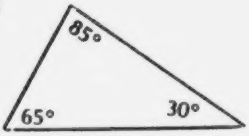
ADAPTED APPLICATIONS:

1. Using your protractor, draw an example of each of the following triangles.

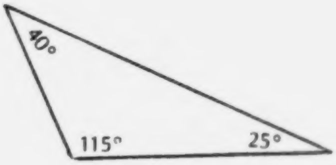
   a) an acute triangle b) a right triangle c) an obtuse triangle

2. Classify each of the following types triangles according to its angles.

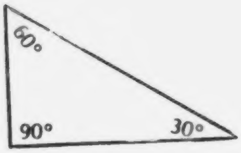
a



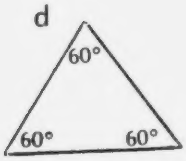
b



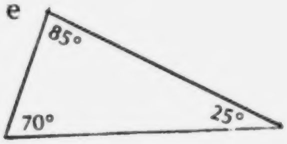
c



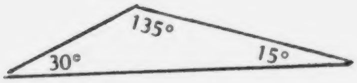
d



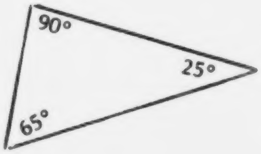
e



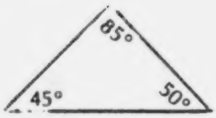
f



g



h



Topic Four

THEME 2: To learn about right triangles.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- name the parts of a right triangle.
- state that the side opposite the right angle is the hypotenuse.
- state that the longest side of a right triangle is the hypotenuse.
- state that the legs of a right triangle (the other two sides) form the right angle.
- use the symbol ∟ to represent a right angle.

VOCABULARY ADAPTATIONS:

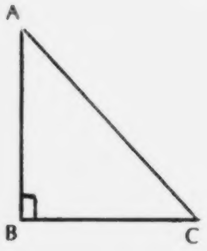
New Terms: legs, hypotenuse, opposite side
Review Term: right triangle

ADAPTATIONS FOR LESSON 4, FM 1, pp. 98-99

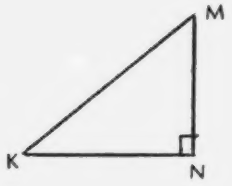
CHALLENGE PROBLEM:

In each of the following right triangles, which is the longest side?

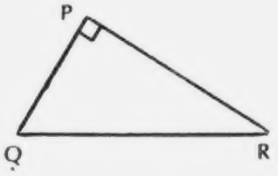
1



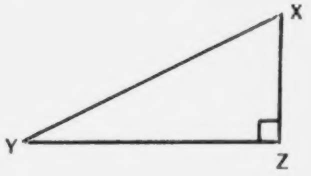
2



3



4



DEVELOPMENT:

A. Discuss challenge problem. Elicit from students that the side opposite the right angle is always the longest side.

   1. The name for this side is the hypotenuse.

   2. The other two sides are called the legs. The legs form the right angle.

   3. The right angle is the largest angle in a right triangle.

   4. The symbol ∟ is used to show a right angle.

B. Do Application C in FM 1 (p. 99).

SUMMARY:

Fill in the following blanks.

1. The right angle in a right triangle is formed by the _______________ of the triangle. (legs)

2. The longest side of a right triangle is called the _______________ . (hypotenuse)

3. In a right triangle the longest side lies _______________ the right angle. (oppoisite)

4. We use the symbol _______________ to represent a right angle (∟)

SUGGESTED TEST ITEMS FOR TOPICS 3 and 4, THEMES 1 and 2

NAME: ____________________

1. For each word or number in column 1, write the letter from column 2 that corresponds to the best meaning or description of the word or phrase.

	Column 1	Column 2
________	1. hypotenuse	A. the number of angles in any triangle
________	2. legs	B. the sum of the measures of all the angles in a triangle
________	3. obtuse triangle	C. a triangle that has an obtuse angle
________	4. 180°	D. the number of degrees in an obtuse angle
________	5. right triangle	E. the number of degrees in an acute angle
________	6. 90°	F. the two shorter sides of a right triangle
________	7. acute triangle	G. the number of degrees in a right angle
________	8. less than 90°	H. a triangle that has three acute angles
________	9. 3	I. a triangle that has a right angle
________	10. more than 90°	J. the longest side in a right triangle

Answers: 1 (J), 2 (F), 3 (C), 4 (B), 5 (I), 6 (G),
7 (H), 8 (E), 9 (A), 10 (D)

II. Complete the following chart:

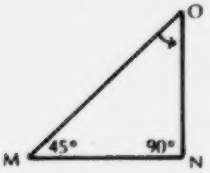
In $\triangle XYZ$,

	∡X	∡Y	∡Z
1.	80°	50°	____°
2.	60°	____°	100°
3.	____°	75°	35°
4.	45°	90°	____°
5.	60°	____°	60°
6.	____°	110°	25°
7.	113°	44°	____°
8.	27°	69°	____°
9.	38°	____°	51°
10.	____°	7°	127°

Answers: 1 (50°), 2 (20°), 3 (70°), 4 (45°),
5 (60°), 6 (45°), 7 (23°), 8 (84°),
9 (91°), 10 (46°)

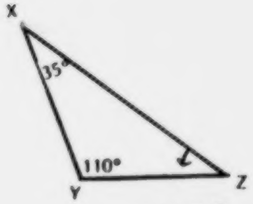
III. Find the measure of the missing angles in each of the following triangles.

a)



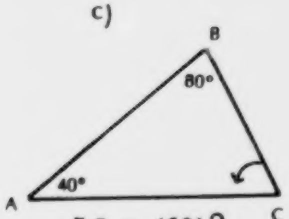
∡ O = (45)°

b)



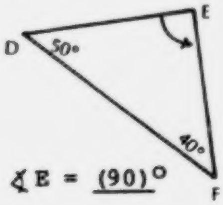
∡ Z = (35)°

c)



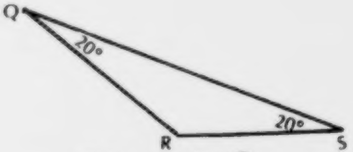
∡ C = (60)°

d)



∡ E = (90)°

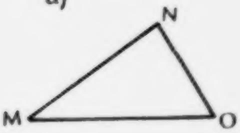
e)



∡ R = (140)°

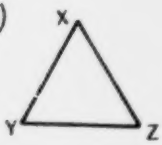
IV. Using your protractor, measure the angles and classify the following triangles.

a)



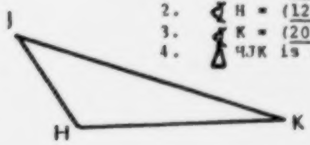
1. ∡ M = (40)°
2. ∡ N = (90)°
3. ∡ O = (50)°
4. △ MNO is a right triangle

b)



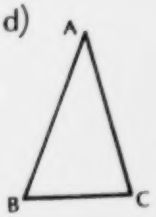
1. ∡ X = (55)°
2. ∡ Y = (65)°
3. ∡ Z = (50)°
4. △ XYZ is an (acute) triangle

c)



1. ∡ J = (40)°
2. ∡ H = (120)°
3. ∡ K = (20)°
4. △ HJK is an (obtuse) triangle

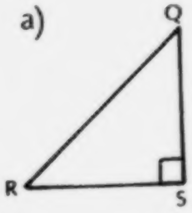
d)



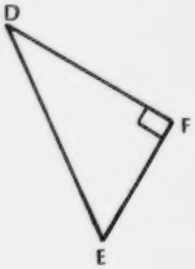
1. ∡ A = (30)°
2. ∡ B = (70)°
3. ∡ C = (80)°
4. △ ABC is an (acute) triangle

V. In the folowing right triangles, which is the hypotenuse and which are the legs?

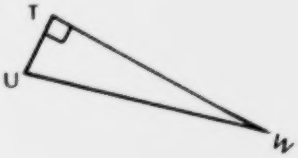
a)



b)



c)



1. hypotenuse - ($\overline{QR}$)
2. leg - ($\overline{RS}$)
3. leg - ($\overline{QS}$)

1. hypotenuse - ($\overline{DE}$)
2. leg - ($\overline{EF}$)
3. leg - ($\overline{DF}$)

1. hypotenuse - ($\overline{UW}$)
2. leg - ($\overline{TU}$)
3. leg - ($\overline{TW}$)

Topic Five

THEME: To learn the Pythagorean rule.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- find the square of whole numbers from 1-20.
- express a perfect square as the product of two equal factors.
- state that a and b in the Pythagorean relationship are the legs, and that c is the hypotenuse.
- state that the sum of the squares of the lengths of the legs of a right triangle equals the square of the length of the hypotenuse $[(\text{leg})^2 + (\text{leg})^2 = (\text{hypotenuse})^2]$
- determine if a triangle is a right triangle using the Pythagorean rule $(a^2 + b^2 = c^2)$

VOCABULARY ADAPTATIONS:

Review Terms: factor, power, square

ADAPTATIONS FOR LESSON 5, FM 1, pp. 100-102

CHALLENGE PROBLEM:

Find the answers to the following:

1. What is six squared?
2. What is six to the second power?
3. What is 6^2?
4. What is the square of the number 6?

DEVELOPMENT:

A. Discuss challenge problem. Elicit that the answers to all four problems are the same: 36. Students should be aware that the four problems are just different ways of expressing the same thing. Reinforce for this topic that "What is the square of ______?" is the new term used.

B. Do Application A in FM 1 (p. 102).

C. Develop the concept that a perfect square can be expressed as the product of two equal factors. Review term factor. "If two or more numbers are multiplied, each number is a factor of the product."

e.g., $\underset{\text{factor}}{2} \times \underset{\text{factor}}{2} = \underset{\text{product}}{4}$

Therefore the number 4 is a perfect square.

D. Do Application 1.

E. Do Developments 2, 3, 7, and 8 in FM 1 (pp. 100-02).

CALCULATOR APPLICATION:

Since the concept of the square of a number is the same as that of repeated multiplication the teacher may wish to have the students prove their self-calculated answers in both the Development and Application by entering the information into the calculator to determine if their answers are correct. The calculator may be used to reinforce the concepts of the perfect square and equal factors.

ADAPTED APPLICATIONS:

Express each of the following as the product of two equal factors where possible and tell whether the given number is a perfect square.

a) 81 = (9 x 9 -- perfect square)
b) 25 = (5 x 5 -- perfect square)
c) 40 = (none, not a perfect square)
d) 1 = (1 x 1 -- perfect square)
e) 16 = (4 x 4 -- perfect square)
f) 63 = (none, not a perfect square)
g) 400 = (20 x 20 -- perfect square)
h) 33 = (none, not a perfect square)
i) 225 = (15 x 15 -- perfect square)
j) 144 = (12 x 12 -- perfect square)

NOTE: No test has been included with this topic. A test will be given at the end of Topic 6 to include all the objectives from both topics.

Topic Six

THEME: To learn how to find the square roots of perfect squares and how to use the Pythagorean rule.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- read the symbol $\sqrt{\ }$ as "the square root of"
- state that the square root of a number is one of its two equal factors.
- find the square roots of perfect squares.
- use the Pythagorean relationship and the concept of finding a square root (by trial and error) to find the hypotenuse of several right triangles with whole numbered sides.
- find the length of a leg of a right triangle using the Pythagorean relationship.

VOCABULARY ADAPTATIONS:

Review Terms: perfect square, hypotenuse, legs, right triangle

ADAPTATIONS FOR LESSON 6, FM 1, pp. 104-106.

DEVELOPMENT:

A. In Development 2, Application B in FM 1 (p. 106), omit Question 4.

B. In Development 3, change the legs of the problem to 9 and 12. Thus, the problem would be solved as follows:

$$a^2 + b^2 = c^2$$

$$9^2 + 12^2 = c^2$$

$$81 + 144 = c^2$$

$$225 = c^2$$

$$\sqrt{225} = c$$

$$15 = c$$

Thus, c =15. Therefore, the hypotenuse of a right triangle whose legs are 9 and 12 is 15.

C. In Development 5, Applications C and D, FM 1 (p. 106), omit C, numbers 3 and 4, and D.

D. Do Application 1.

SUMMARY:

Substitute $\overline{AB}$ is 16 meters and $\overline{BC}$ is 12 meters.

CALCULATOR APPLICATION:

1. This topic introduces the concept of square root. Many calculators have a square root capability and square root key ($\sqrt{\ }$).

2. After introducing the concept, its symbol and development of the objective in the lesson, the teacher may wish to have the students check their self-calculated answers.

3. After the students have done Application A, the teacher should familiarize them with the square root key on the calculator. Explain that this will allow them to determine the square root of any number, whole and decimal. Explain that we will be concerned only with the square roots of whole numbers and perfect squares (i.e., $\sqrt{1}$, $\sqrt{4}$, $\sqrt{9}$, $\sqrt{16}$, $\sqrt{25}$, etc.)

4. Demonstrate the method for obtaining a square root. "What is the square root of 361?" Enter 361. Press ($\sqrt{\ }$) key. Observe that the result, 19, appears without pressing the (=) key. The teacher may use this fact as a way of distinguishing between binary operations (+ , − , x , ÷) and a square root which is UNARY

5. Have the students use the calculator to check their results in Applications A, B, C, and #1.

ADAPTED APPLICATIONS:

Fill in the chart, using the Pythagorean relationship. Check your results by showing that $(\text{leg } 1)^2 + (\text{leg } 2)^2 = (\text{hypotenuse})^2$.

LEG 1	LEG 2	HYPOTENUSE	
3	4	______	(5)
6	______	10	(8)
______	12	15	(9)
5	12	______	(13)
8	______	17	(15)
______	16	20	(12)

SUGGESTED TEST ITEMS FOR TOPICS 5 AND 6

Name: ____________________

1. Express each of the following as the product of two equal factors, where possible, and tell whether the given number is a perfect square.

a) 256 = ________

b) 90 = ________

c) 324 = ________

d) 65 = ________

e) 196 = ________

f) 36 = ________

g) 288 = ________

h) 121 = ________

i) 361 = ________

j) 100 = ________

2. Tell whether the measurements in each group can be the lengths of the sides of a right triangle.

a) 3 feet, 4 feet, 5 feet ________

b) 10 feet, 15 feet, 20 feet ________

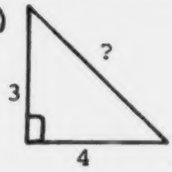
c) 5 mm, 12 mm, 13 mm ________

d) 9 cm, 12 cm, 15 cm ________

e) 17 m, 8 m, 15 m ________

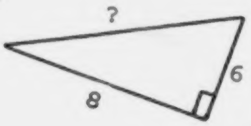
3. Find the missing length in each of the following right triangles.

A)



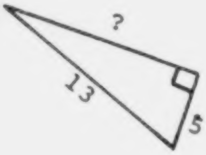
____

B)



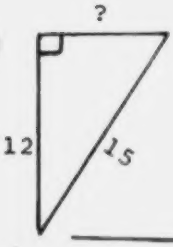
____

C)



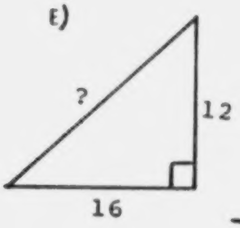
____

D)



____

E)



____

4. Complete each statement

a. The square root of 64 is _____

b. $\sqrt{144 =}$

c. 15^2

d) The square of 7 is _____

e) _____ squared = 169

Topic Seven

THEME 1: To learn how to identify quadrilaterals.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define quadrilaterals.
- define parallel lines.
- use the symbol "$\parallel$" for "is parallel to."
- identify a trapezoid and a parallelogram.
- use arrow symbols to indicate that lines are parallel.

VOCABULARY ADAPTATIONS:

Terms Deleted: rectangle, rhombus, square, diagonal

ADAPTATIONS FOR LESSON 7, FM 1, pp. 107-109

DEVELOPMENT:

A. After Development 1, FM 1 (p. 107), add the following for discussion of quadrilaterals.

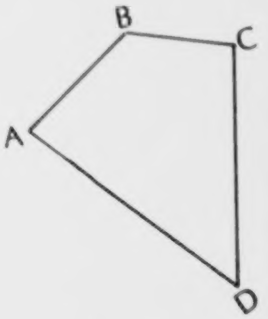
1. Sides are line segments
2. A quadrilateral is named by listing its vertices (beginning with any vertex) in order

Example:

Names

ABCD, or
BCDA, or
CDAB, or
DABC, or
BADC, and so forth

a)

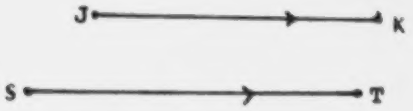


3. We cannot name it ACBD because the vertices are not listed in order.

B. Add to Development 2, FM 1, (p. 107).

1. Many quadrilaterals have sides that are parallel. Parallel lines lie in the same plane and do not meet.

2. Example: The lines on notebook paper, railroad tracks, etc., are parallel. Give names to parallel lines and show diagram.



If $\overline{JK}$ is parallel to $\overline{ST}$, it is shown on the diagram by arrows.

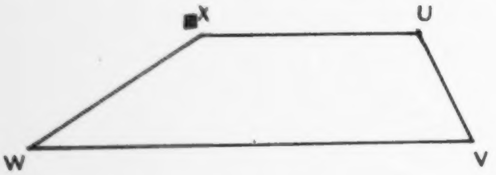
It is represented as $\overline{JK} \parallel \overline{ST}$.

C. Do Application A, FM 1, (p. 108).

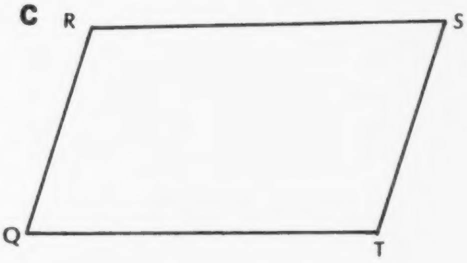
D. Refer to Figure A. Ask if this quadrilateral has parallel lines. Indicate that when a quadrilateral has no parallel lines it has no special name.

E. Show Figure B and Figure C on the chalkboard.

B



C



Have students name the pairs of parallel lines on Figure B and Figure C and indicate with arrows ($\overline{UX} \parallel \overline{VW}$, $\overline{RS} \parallel \overline{QT}$, $\overline{RQ} \parallel \overline{ST}$.)

F. Elicit from students that Figure B has one pair of parallel lines ($\overline{XU} \parallel \overline{WV}$). Therefore we call this quadrilateral a trapezoid.

Definition: A trapezoid is a quadrilateral that has one pair of opposite sides that are parallel.

G. Elicit from students that Figure C has two pairs of parallel lines, $\overline{RQ} \parallel \overline{ST}$ and $\overline{RS} \parallel \overline{QT}$. Therefore we call this quadrilateral a parallelogram.

Definition: A parallelogram is a quadrilateral that has two pairs of opposite sides that are parallel.

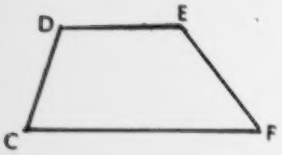
H. Do Application 1.

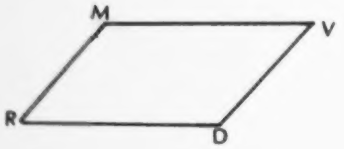
SUMMARY:

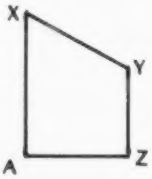
1. Draw a trapezoid. Label it and name the parallel lines.
2. Draw a parallelogram. Label it and name the parallel lines.

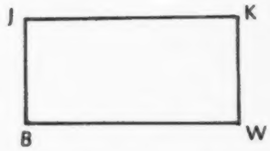
ADAPTED APPLICATIONS:

1. Name the quadrilaterals pictured.
2. Name the parallel lines.
3. Classify each quadrilateral as a trapezoid or a parallelogram.









Topic Seven

THEME 2: To learn about special parallelograms.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- recognize the "special" parallelograms by their shapes (rhombus, rectangle, square).
- define rhombus, rectangle, and square.
- list the properties of the rhombus, rectangle, and square.
- define diagonal.

VOCABULARY ADAPTATIONS:

New Terms:	rectangle, rhombus, square, diagonal
Review Terms:	quadrilateral, parallel, parallelogram, trapezoid, vertices

ADAPTATIONS FOR LESSON 7, FM 1, pp. 107-109

CHALLENGE PROBLEM:

A. Why is Figure 1 a special parallelogram?
B. Why is Figure 2 a special parallelogram?

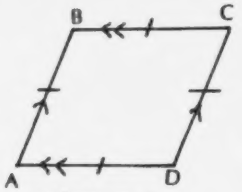


Figure 1

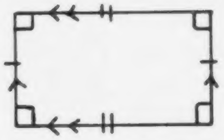


Figure 2

DEVELOPMENT:

A. Discuss challenge problem A. Elicit the following answers about Figure 1:

1. All the sides are equal.
2. the opposite sides are parallel.

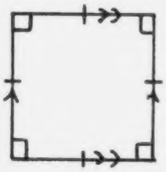
Definition: A rhombus is a parallelogram with all its sides equal.

B. Discuss challenge problem B. Elicit the following answers about Figure 2:

1. The opposite sides are equal.
2. The opposite sides are parallel.
3. All the vertices form right angles.

Definition: A rectangle is a parallelogram with all its angles equal.

C. Show a diagram of a square on the chalkboard as follows:



Ask students for a definition of a square based on the diagram and how it relates to the other special quadrilaterals.

Definition: A square is a parallelogram with all its sides and angles equal.

D. Do Application B in FM 1 (p. 109).

E. Develop the following chart for special parallelograms listing properties of each:

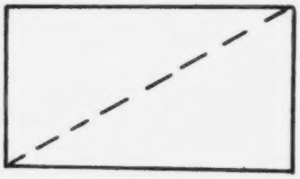
RHOMBUS	RECTANGLE	SQUARE
quadrilateral	quadrilateral	quadrilateral
parallelogram	parallelogram	parallelogram
four equal sides		four equal sides
	four equal angles	four equal angles

F. Do Development 4, F, 1, (p. 108).

G. Do Application 1.

H. Ask students if they know how large their TV screens are. Elicit answers; e.g., 19, 12, 24. How is this determined? Draw diagonal as follows. Explain that the screen is measured by the length of the diagonal.

Definition: A diagonal is the line connecting the opposite vertices of a quadrilateral.



I. Omit cliff-hanger.

SUMMARY:

(Add to the Summary in FM 1 [p. 108].) Answer YES or NO to the following questions:

1. Do all rhombuses have equal angles? __________
2. Do all squares have equal sides? __________
3. Do all parallelograms have equal sides? __________
4. Do all rectangles have equal sides? __________
5. Are all squares parallelograms? __________

ADAPTED APPLICATIONS:

List the properties which are true for each figure named below:

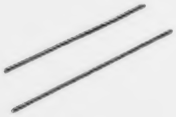
	4 sides	4 equal sides	opposite sides equal	opposite sides parallel	4 equal angles
a) trapezoid					
b) square					
c) rectangle					
d) parallelogram					
e) rhombus					
f) quadrilateral					

SUGGESTED TEST ITEMS FOR TOPIC 7, THEMES 1 AND 2

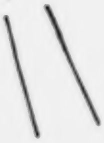
Name: ____________________

1. Which of the following pairs of lines appear to be parallel?

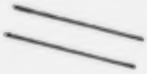
A)



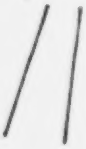
B)



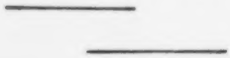
C)



D)

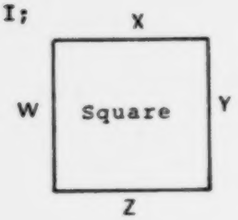


E)



2. For each polygon below:
   a) Name the parallel sides in each figure; and
   b) Mark and name the sides of equal measure in each figure.

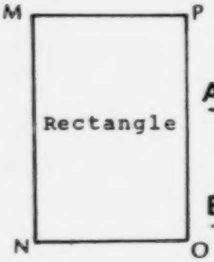
FIGURE I;


X
W
Square
Y
Z

A PARALLEL SIDES ARE; ____________________

B SIDES OF EQUAL MEASURE; ____________________

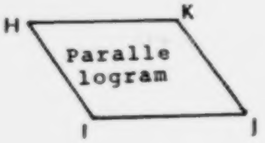
FIGURE II;


M
P
Rectangle
N
O

A PARALLEL SIDES ARE; ____________________

B SIDES OF EQUAL MEASURE; ____________________

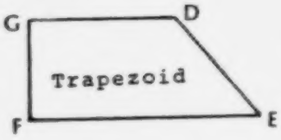
FIGURE III;


H
K
Parallelogram
I
J

A PARALLEL SIDES ARE; ____________________

B SIDES OF EQUAL MEASURE; ____________________

FIGURE IV;

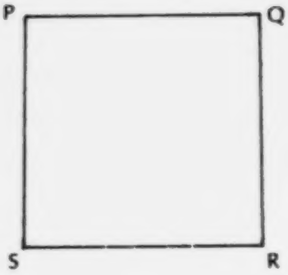

G
D
Trapezoid
F
E

A PARALLEL SIDES ARE; ____________________

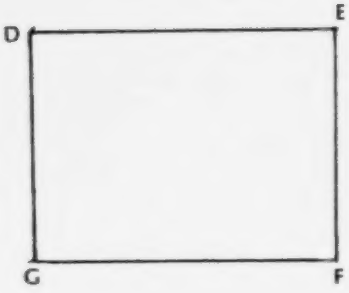
B SIDES OF EQUAL MEASURE; ____________________

3. Draw the diagonals for the following quadrilaterals:

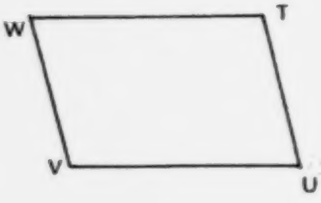
I)



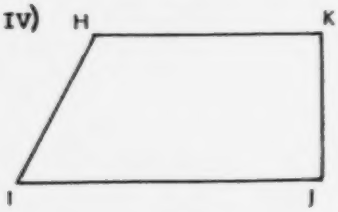
II)



III)



IV)



Topic Eight

THEME 1: To learn about polygons.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- name polygons containing 3, 4, 5, 6, and 8 sides.
- define and identify "regular polygons."

VOCABULARY ADAPTATIONS:

Review Terms:	triangle, quadrilateral
Terms Deleted:	decagon, dodecagon

ADAPTATIONS FOR LESSON 8, FM 1, pp. 110-113

CHALLENGE PROBLEM:

What do the following words mean?: polyester, polygamy

DEVELOPMENT:

A. Discuss challenge problem. Elicit answers from students using the stem poly as a clue to the words. (Poly means more than two or many.)

B. Ask if students can name geometric figures with more than two sides. Elicit: triangle and quadrilateral.

C. Introduce the term polygon.

D. Do Development 1 in FM 1 (p. 110). Exclude items d and e.

E. Do Development 2 , 3, and 4. Exclude the word equiangular and substitute equal angles.

NOTE: For Development 4 in FM 1 (p. 111), go to top of page 112.

SUMMARY:

Add the following to Summary in FM 1 (p. 113):

1. Draw a figure of a regular triangle, a square, and a regular pentagon. (Use a ruler and protractor.)

2. Arrange the following polygons in order from fewest number of sides to most number of sides:
   pentagon, octagon, triangle, hexagon, quadrilateral

Suggested test items will follow Topic 8, Theme 2.

Topic Eight

THEME 2: To learn how to find the sum of the angles in a polygon.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- recall that the sum of the angles of a triangle equals 180°.
- state that the formula for determining the sum of the angles for any polygon is $(n - 2)\ 180^\circ$.
- apply the formula for determining the sum of the angles in a polygon.
- find the measure of each angle in a regular polygon.

VOCABULARY ADAPTATIONS:

Review Terms: formula, polygon, angle, triangle, quadrilateral, pentagon, hexagon, octagon, regular polygon, right angle

ADAPTATIONS FOR LESSON 2, FM 1, pp. 92-94

CHALLENGE PROBLEM:

A. What is the sum of the angles in the triangle in Figure 1?
B. What is the sum of the angles in the square in Figure 2?

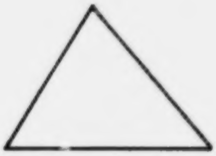


Figure 1

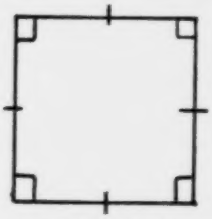


Figure 2

DEVELOPMENT:

A. Discuss challenge problem A. Have students recall that the sum of the angles of any triangle equals 180°.

B. Discuss challenge problem B. If students have difficulty with this question, point out the right angle symbols in the square. Ask them to recall how many degrees are in a right angle -- 90°. Ask the students to count the number of right angles in the square -- 4. Students should be able to determine that $4 \times 90^\circ = 360^\circ$, or the sum of the angles in a square.

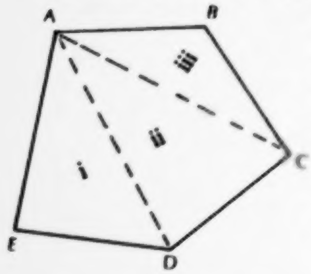
C. Draw a rectangle on the chalkboard; do not include the right angle symbols. Ask students if they can determine the sum of the angles in the rectangle. Elicit that there are four right angles in a rectangle leading to the total $4 \times 90^\circ = 360^\circ$, again.

D. Draw a parallelogram on the chalkboard, again asking the students if they can determine the sum of the angles in the parallelogram. Since there are no right angles in this figure, the students may have trouble determining the answer. Ask if the square, rectangle, and parallelogram have any common characteristic. Elicit that they are all quadrilaterals. Ask the students to look at the parallelogram. Fill in a diagonal line and ask them what they can now see. Elicit: two triangles. Now ask what the sum of the angles in the parallelogram may be. Show that (a) since a triangle has a sum of 180° in its angles, and (b) since there are two triangles showing in the parallelogram with a diagonal, then (c) $2 \times 180^\circ = 360^\circ$ in the parallelogram.

E. Return to the square and the rectangle and fill in the diagonals for them, thus illustrating two triangles formed in each figure. Ask the students if they can come to any conclusions from this information. Attempt to elicit that the square, rectangle, and parallelogram are all quadrilaterals, and all have a sum of 360° in their angles. Therefore, all quadrilaterals have a sum of 360° in their angles. You may wish to prove this with the visual use of a diagonal in a trapezoid.

F. Do Application 1.

G. Ask the students if they can find an easier way to determine the sum of the angles in polygons. Explain that a traingle has three sides and 180° within, and that a quadrilateral has four sides and 360, or $2 \times 180^\circ$ within. Ask if it is possible that a pentagon which has five sides has 540°, or $3 \times 180^\circ$ within. Demonstrate visually as follows:



1. Starting with vertex A, draw a diagonal to all other opposite vertices. (Vertices B and E are connected to vertex A, and thus not opposite.)

2. How many triangles are formed?

3. $3 \times 180^\circ = 540^\circ$

H. Ask the students if they can discover a formula to compute the sum of the angles in a polygon. Lead them to see that the number of sides of a polygon, minus 2, multiplied by 180°, is the formula. Display as

$$(n-2) \quad 180^\circ = \text{sum of the angles in a polygon.}$$

Have students apply the rule to the triangle, quadrilateral and pentagon; i.e., triangle has 3 sides; 3 minus 2 equals 1.

$$1 \times 180^\circ = 180^\circ \text{ in a triangle}$$

quadrilateral has 4 sides; 4 minus 2 equals 2.
$2 \times 180^\circ = 360^\circ$ in a quadrilateral

pentagon has 5 sides; 5 minus 2 equals 3.
$3 \times 180^\circ = 540^\circ$ in a pentagon

I. Apply both the formula and the visual method of drawing all the diagonals from one vertex to both the hexagon and octagon to prove the formula.

J. Review the concept of the "regular polygon." Elicit that all of the sides in a regular polygon are of equal length, and all the angles in the polygon are equal. Thus, how can we determine the number of degrees for an angle in a regular polygon? Attempt to elicit that

$$\text{Each } \angle = \frac{\text{sum of the } \angle \text{ s}}{\text{number of equal } \angle \text{ s or number of sides}}$$

i.e.,

a. pentagon has 5 sides and 5 equal angles

b. pentagon has 540° as $\angle$ sum $[3 \times 180^\circ = 540]$

c. therefore, each $\angle = 540 - 5 = 108^\circ$

K. Apply the rule to triangles, quadrilaterals, hexagons, and octagons.

L. Do Applications 2 and 3.

ADAPTED APPLICATIONS:

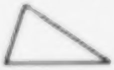
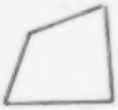
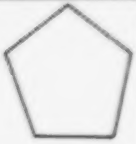
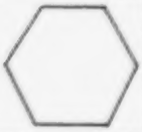
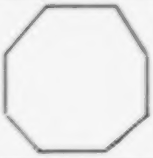
1. In each of the following, find the measure of the fourth angle of a quadrilateral when the other three angles measure:

   a. 65°, 71°, and 104°

   b. 89°, 89°, and 120°

   c. 120°, 15°, and 162°

2. Complete the following:

Diagram	Name of Polygon	Number of sides	Number of Triangles formed by drawing diagonals from one vertex	Sum of the angles
				
				
				
				
				

3. Find the measure of one angle in a regular polygon of:

a. 6 sides
b. 10 sides
c. 5 sides
d. 12 sides

NOTE: Use the Applications from Topic 8, Themes 1 and 2, and the Applications in Lesson 8, FM 1 (p. 113), to construct a test to be given at the end of Topic 8.

Topic Nine

THEME: To learn how to calculate the perimeter of any polygon, through the addition of whole numbers, decimals, and fracations.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- apply the rules for adding fractions with like and unlike denominators.
- apply the rule for adding decimal numbers.
- define the term "perimeter."
- calculate the perimeters of polygons.

VOCABULARY ADAPTATIONS:

Review Terms: fractions, denominator, decimal numbers, length, width

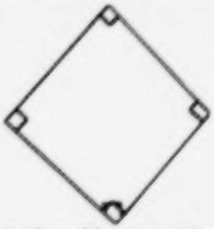
ADAPTATIONS FOR LESSON 10, FM 1, pp. 116-117

CHALLENGE PROBLEM:

Mookie Wilson of the New York Mets hit an inside-the-park home run. How far did he have to run?

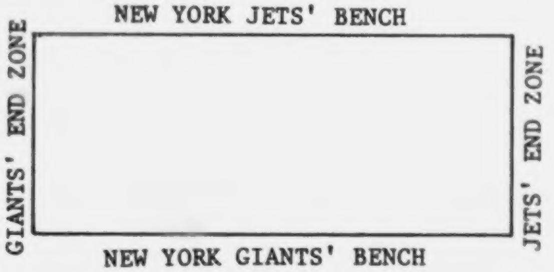
DEVELOPMENT:

A. Discuss the challenge problem. Elicit from the students that the ball player had to run around the bases on the baseball diamond to score the home run. Illustrate the baseball diamond on the chalkboard.



Ask the students what geometric figure the diamond resembles. Elicit "the square." Now elicit the distance between home plate and first base: 90 feet. Ask the class: "If the baseball diamond is a square, and the distance between home and first base is 90 feet, what are the distances between all the other bases?" Elicit that a square has four sides of equal length, thus the distance between each base is 90 feet. Ask the students how we can compute the answer to the challenge problem, eliciting that there are four bases, (first, second, third and home) and that each is 90 feet from the other. Thus Mookie had to run 90 feet + 90 feet + 90 feet + 90 feet = 360 feet. (home to first; first to second; second to third; third to home)

B. Introduce and define the term "perimeter" as the distance around any polygon. The baseball diamond is a polygon. The distance around the diamond, or the perimeter of the baseball diamond, is 360 feet. Ask the class: "What is the perimeter of a football field?" Illustrate on the chalkboard.



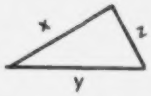
Ask the class what geometric figure the football field resembles. Elicit that it is a rectangle. Ask if there is a way to calculate the perimeter of a football field. Elicit that adding the length of the four sides of the field would determine the perimeter. Tell the class that the length of the field is 100 yards and the width is 40 yards. Ask them to compute the perimeter. Illustrate on the chalkboard as:

100 yards + 40 yards + 100 yards + 40 yards
or
(2 x 100) + (2 x 40)
or
200 + 80 = 280 yards
(Jets bench + Jets end zone +
Giants bench + Giants end zone)

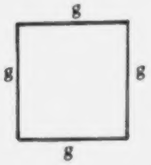
Thus the perimeter of a football field is 280 yards.

C. Ask the students to determine a formula for computing the perimeter of polygons. Elicit that the perimeter of any polygon is the sum of the lengths of all of the sides of a polygon. Thus:

Triangles -- sum of the three sides, i.e.: so, $P = x + y + Z$



Squares -- sum of the four equal sides, i.e.: so, $P = g + g + g + g$, or $P = 4g$



Rectangles -- sum of the four sides, where the opposite sides are equal, i.e.: so, $P = r + r + t + t$ or $P = 2r + 2t$

D. Do the challenge problem in FM 1, (p. 116).

E. Do Development 1 in FM 1 (p. 116). It will be necessary to spend a portion of time reviewing the addition of fractions with like and unlike denominators, first covered in Unit 2, Topic 12 in FM 1 (pp. 54-55).

F. Do Adapted Application 1.

G. Introduce the concept of adding decimal numbers. It is essential that the students add these numbers vertically, and that the decimal points in the numbers be directly underneath one another. The decimal point must always be carried down into the sum, or answer, in the same position. Example:

ADD: 2.35 + .72 + 27.8

1. Have students express in vertical form
2. Check to see that decimal points are aligned
3. Compute the answer with the decimal point in the same position

$$\begin{array}{r} 2.35 \\ .72 \\ +\ 27.8 \\ \hline 30.87 \end{array}$$

NOTE: For students having difficulty aligning the decimal points properly you may wish to have them draw a vertical line with their rulers from the decimal point in the top number through to the decimal point in the answer,

$$\begin{array}{r} 2.35 \\ .72 \\ +\ 27.8 \\ \hline 30.87 \end{array}$$

H. Do Adapted Application 2, and then Applications 1 and 2 in FM 1 (p. 117).

I. Omit the cliff-hanger.

SUMMARY:

Add the following to the Summary in FM 1, (p. 41):

1. The distance around a polygon is called the ______________.

2. To find the perimeter of a polygon we ______________ the lengths of the sides.

3. How much fencing is needed to enclose a rectangular yard 20 feet wide and 15 feet long?

____

4. What is the distance around a room that is a square if one side is 13 feet long?

____

ADAPTED APPLICATIONS:

Add the following fractional numbers:

a) $$\begin{array}{r} \frac{3}{7} \\ + \ \frac{2}{7} \\ \hline \end{array}$$

b) $$\begin{array}{r} \frac{1}{10} \\ + \ \frac{7}{10} \\ \hline \end{array}$$

c) $$\begin{array}{r} \frac{7}{12} \\ \frac{2}{12} \\ + \ \frac{3}{12} \\ \hline \end{array}$$

d) $$\begin{array}{r} \frac{4}{5} \\ \frac{1}{5} \\ + \ \frac{3}{5} \\ \hline \end{array}$$

e) $$\begin{array}{r} \frac{1}{4} \\ \frac{3}{8} \\ + \ \frac{1}{2} \\ \hline \end{array}$$

f) $$\begin{array}{r} \frac{4}{5} \\ 8\ \frac{1}{10} \\ + \ 2\ \frac{1}{3} \\ \hline \end{array}$$

g) $$\begin{array}{r} 2\ \frac{1}{3} \\ 3\ \frac{3}{4} \\ + \ 6\ \frac{5}{6} \\ \hline \end{array}$$

h) $$\begin{array}{r} 11\ \frac{3}{7} \\ 26\ \frac{1}{4} \\ + \ 18\ \frac{1}{2} \\ \hline \end{array}$$

i) $$\begin{array}{r} 9\ \frac{5}{9} \\ 2\ \frac{1}{3} \\ + \ 4\ \frac{5}{6} \\ \hline \end{array}$$

j) $$\begin{array}{r} 7\ \frac{1}{12} \\ 3\ \frac{3}{4} \\ + \ 2\ \frac{1}{3} \\ \hline \end{array}$$

2. Add the following decimal numbers:

a) 0.8 + 1.7 + 6.82 = ____________________

b) 1.6 + 2.9 + 0.5 = ____________________

c) 28.4 + 13.62 + 0.21 = ____________________

d) 1.6 + 2.75 + 13.648 = ____________________

e) 15.4 + .27 + 1.36 + .079 = ____________________

CALCULATOR APPLICATION:

This topic lends itself to the use of the calculator. Review correct precedure for the operation of the calculator. Emphasize that the decimal point must be punched in exactly where it appears in the number.

Example: 2.35 + .72 + 27.8

Enter as:

(a) numeral 2 (b) decimal point key (c) numeral 3 (d) numeral 5 (e) addition sign (f) decimal point key (g) numeral 7 (h) numeral 2 (i) addition sign (j) numeral 2 (k) numeral 7 (l) decimal point key (m) numeral 8 (n) equals sign.

This should display the correct answer: 30.87

NOTE: No test items will be included with this topic. A test will be included at the end of the next topic that will cover both Topics 9 and 10.

Topic Ten

(corresponds to Lesson 11 in FM 1)

THEME: To learn how to solve various applicaton problems involving the perimeters of polygons.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- apply the rules for subtracting mixed numbers.
- apply the rules for subtracting decimals.
- use the properties of some polygons to solve perimeter problems.
- find the length of a side when the perimeter and other sides are given.

VOCABULARY ADAPTATIONS:

Review Terms: polygons, isosceles, equilateral, scalene, square, rectangle, regular pentagon, regular hexagon, regular octagon

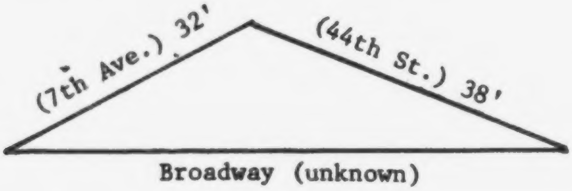
ADAPTATIONS FOR LESSON 11, FM 1, pp. 118-120

CHALLENGE PROBLEM:

One New Year's Eve the police had to rope off a section of Times Square. The section they roped off was shaped like a triangle. One side, 7th Avenue, was 32 feet. Another side, 44th Street, was 38 feet, and the remaining side, Broadway, was unknown. The total distance around the section was 128 feet. What was the length on Broadway?

DEVELOPMENT:

A. Discuss challenge problem with use of diagram.



B. After challenge problem, do the following.

1. Review subtraction of fractional numbers.

2. Review division of decimals by whole numbers.

C. Do Application 1.

D. Develop the concept of subtracting decimals, when the problem is given verbally, e.g.:

1. SUBTRACT 1.28 from 3.65

Line up decimal points

$$\begin{array}{r} 3.65 \\ -\ \underline{1.28} \end{array}$$

Put decimal point in answer and proceed as in any subtraction example.

2. FIND 17 minus .7

a) Write 17 as 17.0	17.0
b) Place .7 in decimal column	- .7
c) Subtract	16.3

E. Do Application B, FM 1 (p. 119).

F. Do Application A, FM 1 (pp. 118-19).

G. Do Development 3 in FM 1 (pp. 118-19).

H. Review properties of isosceles and equilateral triangles, rectangles, squares, and other regular polygons (pentagons, hexagons, octagons).

I. Do Applications 2 through 5 and Application C, FM 1 (p. 120).

SUMMARY:

Add the following to Summary in FM 1 (p. 120).

1. The perimeter of an isosceles triangle is 80 cm. What is the length of the two equal sides if the third side is 20 cm?

2. The perimeter of a square table is 96 inches. What is the length of each side?

3. A floor tile is shaped like a regular hexagon. The perimeter is 19.2 inches. What is the length of each side?

4. A room shaped as a rectangle is 9 feet wide and 12 feet long. New molding is needed to place around the perimeter of the room. What is the perimeter of the room?

CALCULATOR APPLICATION:

1. This is an excellent opportunity to review the basic operations of calculator use. It will be necessary for the teacher to spend a portion of time reviewing the correct procedure for entering the information into the calculator.

2. Any problem dealing with whole numbers and/or decimal numbers may be computed on the calculator; i.e.:

> "The perimeter of a triangle is 17 feet.
> One side is 4.37 feet and a second side is 6.8 feet.
> What is the length of the third side?"

Enter as:

(a) numeral 1 (b) numeral 7 (c) subtraction sign (d) numeral 4
(e) decimal point key (f) numeral 3 (g) numeral 7 (h) subtraction sign
(i) numeral 6 (j) decimal point key (k) numeral 8 (l) equals sign

This should display the correct answer: 5.83; the length of the third side, in feet.

3. If the teacher wishes to have the students use the calculator to compute perimeter problems containing fractional numbers , it will be necessary to review the concept of converting a fractional number into a decimal number, which was first covered in Topic 10 in Unit III and Lesson 10, FM 1 (pp. 85-86).

ADAPTED APPLICATIONS:

1. Subtract the following decimal numbers:

[a] $\begin{array}{r} 1.3 \\ -\ .9 \\ \hline \end{array}$ [d] $\begin{array}{r} 27.4 \\ -\ 19.9 \\ \hline \end{array}$

[b] $\begin{array}{r} 7.4 \\ -\ 1.8 \\ \hline \end{array}$ [e] $\begin{array}{r} 8 \\ -\ .4 \\ \hline \end{array}$

[c] $\begin{array}{r} 9.5 \\ -\ 3.6 \\ \hline \end{array}$ [f] $\begin{array}{r} 17 \\ -\ 5.5 \\ \hline \end{array}$

2. Complete the following table. The length given is one of the equal sides of an isosceles triangle.

	a	b	c	d	e
Equal side	$6\frac{1}{2}$	$8\frac{3}{5}$	5.7	6.9	12
Perimeter	$22\frac{1}{3}$	$30\frac{1}{10}$	18.9	20	38
Third side	_____	_____	_____	_____	_____

3. For the following equilateral triangles, one side is given. Find the perimeter.

   a. $s = 5$
   b. $s = 12.3$
   c. $s = 6\frac{1}{4}$
   d. $s = 8.2$
   e. $s = 4\frac{1}{3}$

4. For each of the following equilateral triangles, the perimeter is given. Find the length of a side of the triangle.

   a. $p = 39$
   b. $p = 63$
   c. $p = 5.7$
   d. $p = 9.9$
   e. $p = 12\frac{3}{4}$

5. Find the length of the side of each square whose perimeter is given.

   a. $p = 44$
   b. $p = 60.8$
   c. $p = 80\frac{4}{10}$
   d. $p = 7.6$
   e. $p = 56$

SUGGESTED TEST ITEMS FOR TOPICS 9 AND 10

Name: ____________________

I. Compute the following:

a. ADD 7.8 + .49 + 61.96

b. ADD .516 + 7. + 18.3

c) $\begin{array}{r} 14.61 \\ 3.2 \\ +\ .94 \\ \underline{7.7} \end{array}$

d) $\begin{array}{r} 13.82 \\ \underline{-\ 6.47} \end{array}$

e) $\begin{array}{r} 7.8 \\ \underline{-\ .9} \end{array}$

II. Compute the following:

a) $\begin{array}{r} 7\frac{1}{8} \\ 2\frac{4}{8} \\ \underline{+\ 13\frac{2}{8}} \end{array}$

b) $\begin{array}{r} 3\frac{1}{4} \\ 14\frac{3}{8} \\ \underline{6\frac{1}{2}} \end{array}$

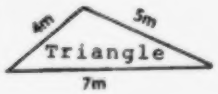
c) $\begin{array}{r} 5\frac{3}{5} \\ \underline{-2\frac{4}{5}} \end{array}$

d) $\begin{array}{r} 8\frac{1}{4} \\ \underline{-\ 3\frac{2}{3}} \end{array}$

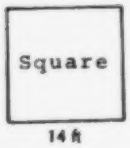
e) $\begin{array}{r} 17 \\ \underline{-\ 4\frac{1}{8}} \end{array}$

III. Calculate the perimeter of the following polygons:

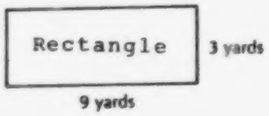
a)


4m
5m
Triangle
7m

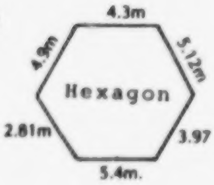
b)


Square
14 ft

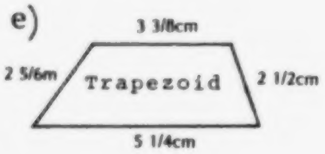
c)


Rectangle
3 yards
9 yards

d)

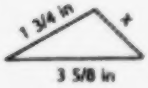

4.3m
4.9m
5.12m
Hexagon
2.81m
3.97
5.4m.

e)

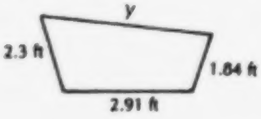

3 3/8cm
2 5/6m
Trapezoid
2 1/2cm
5 1/4cm

IV. Find the length of the missing side in each diagram:

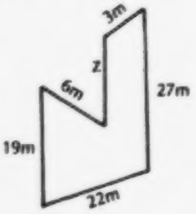
A.) P=6 1/4 inches


1 3/4 in
x
3 5/8 in

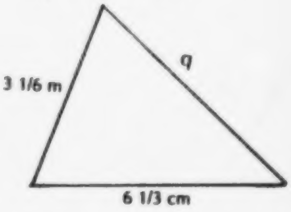
B.) P=9.3 feet


y
2.3 ft
1.84 ft
2.91 ft

C.) P=87 meters


3m
z
6m
27m
19m
22m

D.) P=13 5/9 cm


3 1/6 m
q
6 1/3 cm

X =________ Y=________ Z=________ Q=________

Topic Eleven

(corresponds to Lesson 9 in FM 1)

THEME: To understand and identify some of the points and lines in a circle.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define a circle as the figure formed by all the points a given distance from a fixed point.
- state that a circle can be approximated by constructing a regular polygon with a "large" number of sides (24 sides, for example).
- define and draw a radius, a diameter, a chord, an arc, a sector.
- state the relationship between a radius and a diameter.
- solve arithmetic problems relating diameters and radii, which use fractions and decimals.
- construct a circle using a compass.

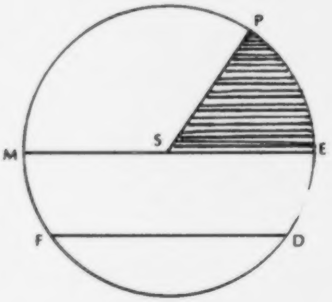
VOCABULARY ADAPTATIONS:

Review Terms: regular polygon

ADAPTATIONS FOR LESSON 9, FM 1, pp. 114-115

DEVELOPMENT:

A. For Development 3 in FM 1 (p. 114), use the following illustration and definitions:



1. The symbol for circle is ⊙ . the circle is named by its center point. Thus, this circle is named ⊙ S.

2. Radius -- This is a line segment that connects the center point and any point on the circle. The plural of radius is radii. All radii in a circle are equal in length. $\overline{SP}$ is a radius of ⊙ S. $\overline{SE}$ and $\overline{SM}$ are also radii of ⊙ S.

3. Chord -- This is a line segment that connects any two points on the circle. $\overline{FD}$ is a chord of ⊙ S.

4. Diameter -- This is a chord that passes through the center of the circle. It is the longest chord in a circle. All diameters in a circle are equal. Thus $\overline{MSE}$ is a diameter of ⊙ S.

5. Arc -- This is a part of a circle that connects any two points on the circle. It is made up of these two points and all the points on the circle in between these two points. The symbol for arc is ⌒ . $\overset{\frown}{FM}$ is an arc in ⊙ S.

6. Sector -- This is a part inside the circle that is formed by two radii and an arc. Thus SPE is a sector formed by radii $\overline{SP}$ and $\overline{SE}$ and the arc $\overset{\frown}{PE}$.

B. Do Application 1.

C. Do Developments 4 and 5, and Applications A and B in FM 1 (p. 115).

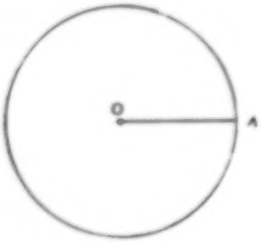
NOTE: It would be beneficial to introduce the compass and its correct use to the students. But it is not the major objective of the topic. Do not emphasize beyond the frustration point.

D. Do the Summary in FM 1 (p. 115).

ADAPTED APPLICATIONS:

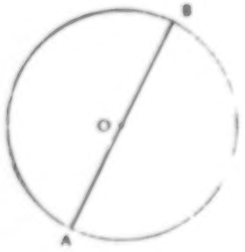
1. Choose the correct answer:

If O is the center of the circle below, what is the line segment $\overline{OA}$ called?



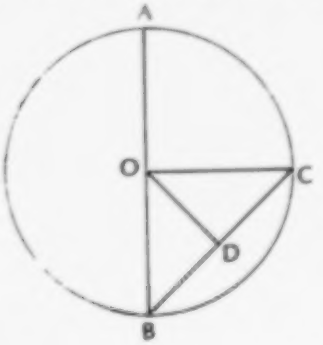
a. an arc
b. a chord
c. a radius
d. a diameter

2. Points A and B are on circle O and $\overset{\frown}{AB}$ passes through the center. What is AB?



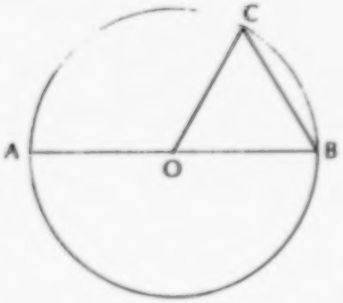
a. an arc
b. a sector
c. a radius
d. a diameter

3. In the circle below, which line segment is a radius?



a. $\overline{AO}$
b. $\overline{OB}$
c. $\overline{OC}$
d. $\overline{CB}$

4. In the circle below, which line segment is the chord?



a. $\overline{AO}$
b. $\overline{OB}$
c. $\overline{OC}$
d. $\overline{CB}$

Topic Twelve

THEME: To learn how to find the circumference of a circle using the decimal approximation of π .

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define circumference.
- measure the circumferences of common objects using rulers and strings.
- apply the rules for finding the length of the diameter when the radius is known.
- apply the rules for finding the circumference of a circle when the length of the radius or diameter is given in decimals or whole numbers.
- state that the value of π (pi) is approximately equal to 3.14.

VOCABULARY ADAPTATIONS:

Review Terms: Geometric figure, line segment, length, decimal numbers, whole numbers, perimeter.

CHALLENGE PROBLEM:

"You are building a disco-roller skating rink. This rink is in the shape of a circle. How could you figure out the amount of fencing you would need to close in this rink?"

ADAPTATIONS FOR LESSON 12, FM 1, pp. 122

DEVELOPMENT:

A. Omit Development 1c in FM 1 (p. 122).

B. Prior to Development 2 in FM 1 (p. 122), review multiplication of decimals; e.g.,

a) $\begin{array}{r} 2.69 \\ \times\ \ 56 \\ \hline \end{array}$ b) $\begin{array}{r} 201 \\ \times\ 3.82 \\ \hline \end{array}$

NOTE: 1) This review lesson must emphasize the correct placement of the decimal point.
2) CALCULATOR APPLICATION: The teacher should lead the class in reviewing the correct procedures for entering required information into calculator. Emphasize the correct placement of the decimals and use of the decimal key, i.e.:

Enter into calculator as follows:

$$\begin{array}{r} 7.83 \\ \times\ \ 25 \\ \hline \end{array}$$

(a) numeral 7 key (b) decimal point key (c) numeral 8 key
(d) numeral 3 key (e) multiplication key (f) numeral 2 key
(g) numeral 5 key (h) equals key.

This procedure should display the correct answer of 195.75.

C. After Development 2 in FM 1 (p. 122), add the following: Introduce the concept that another formula for finding the circumference of a circle is $C = 2\pi r$. Explain that since $2r = d$ we can substitute $2r$ for d in the formula to compute the correct answer.

Demonstrate both formulas.

Given that the radius of a circle is 5 inches:

$C = \pi d$	$C = 2\pi r$
1. $d = 2r$	1. $C = 2 \times 3.14 \times 5$ in.
2. $d = 2 \times 5$ in.	2. $C = 6.28 \times 5$ in.
3. $d = 10$ in.	3. $C = 31.40$ in.
4. $C = \pi d$	
5. $C = 3.14 \times 10$ in.	
6. $C = 31.40$ in.	

Both formulas compute to the same answer.

NOTE: There will be no test items included with this topic. A test will be included at the end of the next topic that will cover both Topics 12 and 13.

Topic Thirteen

THEME: To learn how to find the circumference of a circle using pi (π) expressed as a fraction.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

. find the circumferences of circles using $\frac{22}{7}$ for π where the radii and diameters may contain fractions.

VOCABULARY ADAPTATIONS:

Review Terms: perimeter, fractions, length, square, equivalent

ADAPTATIONS FOR LESSON 13, FM 1, pp.

CHALLENGE PROBLEM:

Is the circumference of a round pizza pie whose diameter is $1\frac{2}{5}$ feet long greater than, less than, or equal to a square baseball base whose side measures $1\frac{1}{5}$ feet?

DEVELOPMENT:

A. Omit Development 1 in FM 1 (p. 123).

B. Discuss the adapted challenge problem in terms of measuring circumferences and perimters and comparing lengths.

C. Elicit the formula for finding the circumference of a circle. Use this formula to find the circumference of the pizza pie. Demonstrate:

$$C = \pi d$$
$$C = 3.14 \times 1\frac{2}{5} \text{ feet}$$

D. Point out to the students that we are multiplying a mixed number by a decimal number. We could either make them both decimal numbers or make them both fractions. It is easier to change $1\frac{2}{5}$ to a fraction when we know that π (pi) can be expressed as the fraction $\frac{22}{7}$.

E. CALCULATOR APPLICATION: Use the calculator to demonstrate that $\frac{22}{7}$ and 3.14 are approximately the same.

(a) numeral 2 key (b) numeral 2 key (c) division key
(d) numeral 7 key (e) equals key. This will display the result $\frac{22}{7} = 3.1428571$.

The teacher may round off 3.1428571 to 3.14 to demonstrate that $3.1428571 \approx 3.14$. (A discussion of rounding off is in the next unit.)

F. Review the application of the rule for changing a mixed number to an improper fraction, i.e.:

$$1\frac{2}{5} = \frac{1 \times 5 + 2}{5} = \frac{5 + 2}{5} = \frac{7}{5}$$

G. Since (pi) can be expressed as a fraction, we can substitute in the formula as follows:

$$C = \pi d$$
$$C = \frac{22}{7} \times \frac{7}{5}$$

H. Introduce the rule for multiplying fractions, i.e.:

$$\frac{\text{numerator x numerator}}{\text{denominator x denominator}}$$

I. Complete the problem finding the circumference of the pizza pie with the diameter of $1\frac{2}{5}$ feet.

1) $C = \pi d$
2) $C = \frac{22}{7} \times \frac{7}{5}$
3) $C = \frac{22 \times 7}{7 \times 5} = \frac{154}{35} = 4\frac{14}{35}$

$\therefore C = 4\frac{14}{35}$

J. Do Application A in FM 1 (p. 124).

K. Elicit the answer to the part of the challenge problem pertaining to the perimeter of a square. Review the rule $P = 4S$ $\therefore P = 4 \times 1$ feet.

Review changing a mixed number to an improper fraction, i.e.:

$$1\frac{1}{5} = \frac{1 \times 5 + 1}{5} = \frac{5 + 1}{5} = \frac{6}{5} \text{ feet}$$

Thus, $p = 4 \times \frac{6}{5}$ feet.

NOTE: Review the method of changing a whole number to a fraction by simply placing that whole number over a denominator with the value of 1. Thus, 4 expressed as a fraction would $\frac{4}{1}$.

$\therefore p = \frac{4}{1} \times \frac{6}{5}$ feet $\qquad p = \frac{4 \times 6}{1 \times 5} = \frac{24}{5} = 4\frac{4}{5}$

L. Compare the circumference of the pizza pie and the perimeter of the baseball base for equivalency, i.e.:

Is $4\frac{14}{35}$ less than, equal to, or greater than $4\frac{4}{5}$

It is necessary to change both fractions to equivalent fractions with common denominators.

1. Find the L.C.D. for 35 and 5 using multiples of 5: 5, 10, 15, 20, 25, 30, 35.

2. Convert $\frac{4}{5}$ to an equivalent fraction with a denominator of 35.

3. $\frac{4}{5} = \frac{?}{35} = \frac{4 \times 7}{5 \times 7} = \frac{28}{35}$

   $4\frac{4}{5} = 4\frac{28}{35}$

4. $4\frac{14}{35}$ is less than $(<)$ $4\frac{28}{35}$

   $\therefore 4\frac{14}{35}$ the cirumference of the pizza pie is less than $4\frac{4}{5}$ the perimeter of the baseball base.

M. Do Application B and Summary in FM 1 (p. 124).

SUGGESTED TEST ITEMS FOR TOPICS 12 AND 13

Name: ______________________

I. Compute the following:

a) $\begin{array}{r} 4.64 \\ \times\ \ 32 \\ \hline \end{array}$

b) $\begin{array}{r} 3.14 \\ \times\ \ 38 \\ \hline \end{array}$

c) $\begin{array}{r} 125 \\ \times\ 3.87 \\ \hline \end{array}$

d) $\begin{array}{r} 27 \\ \times\ 6.31 \\ \hline \end{array}$

II. Compute the following:

a) $\frac{3}{8} \times \frac{1}{3} =$

c) $5 \times 3\frac{1}{5} =$

b) $2\frac{1}{4} \times \frac{5}{7} =$

d) $4\frac{1}{3} \times 2\frac{3}{7} =$

III. Compute the circumference of each circle using $\pi = 3.14$.

a) diameter = 8 in.

b) diameter = 4.7 feet

c) radius = 11 m

d) radius = 5.9 km

IV. Compute the circumference of each circle using $\pi = \frac{22}{7}$

a) diameter = $\frac{3}{8}$ in.

b) radius = $1\frac{1}{2}$ m

c) diameter = $2\frac{1}{4}$ feet

d) radius = $6\frac{1}{4}$ cm

UNIT V — MONEY MANAGEMENT

INTRODUCTION

Within the framework of basic consumer education are concepts such as unit pricing, making change in dollars and cents, computing salary, reading time cards, installment purchases, and sliding scale purchases. Unit V attempts to use these to reinforce both the basic math computation skills, and many concepts introduced in the earlier units. The major new concept that is dealt with for the first time in this unit is that of rounding off decimal numbers to the nearest hundredth, or "cent value." Extensive review of addition, subtraction, multiplication and division of both whole and decimal numbers takes place in these topics. Conversion of fractions to decimals also is dealt with in this unit.

A major portion of the unit will deal with topics that may also be useful in dealing with such important issues as career education, economics, and consumer education. While the major math concepts and skills are directly related to the F.M. 1 curriculum, and the R.C.T. exam, it is quite possible and logical to infuse much of this unit into other disciplines.

Topic One

THEME: To learn how to subtract dollars and cents from whole dollar amounts.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state that a whole dollar consists of one hundred separate parts.
- express money value written in terms of cents as a decimal number.
- express whole dollar amounts as whole numbers.
- determine that every cent in a dollar is one hundredth of a dollar.
- express one hundredth of a dollar as the decimal number .01.
- determine that every ten cents in a dollar is one tenth of a dollar.
- express one tenth of a dollar as the decimal number .10.
- determine the change for items that are paid for by $1, $5, $10 or $20 bills.

VOCABULARY ADAPTATIONS:

REVIEW TERMS: decimal point, decimal number, whole number, hundredths, tenths

ADAPTATIONS FOR LESSON 1 F.M. 1 guide, pp 133-134.

CHALLENGE PROBLEM: Maria bought the new Earth, Wind and Fire record for $1.49, and the new Santana record for $1.75. She paid for these records with a $5 bill. How much change should Maria receive from the cashier?

DEVELOPMENT:

A. Discuss the challenge problem with the class. The teacher should take this opportunity to review the decimal chart that was developed in Unit 3 on the Metric System, in Topic 1, Theme 2. The chart, located on page 137 in the F.M. 1 ADAPTED CURRICULUM guide, will be most helpful in reviewing the appropriate place value for the decimal numbers. Emphasize that when you are expressing money values as decimal numbers, that the students need only be concerned with the tenths and hundredths place values.

B. The teacher must also review the process of adding decimal numbers. Lining up the decimal points, one underneath the other so that the correct place values are held, is essential. This is the proper time to review expressing whole numbers in terms of decimal numbers, such as $5 = $5.00. Review of the use of zeroes as place holders should also be done at this stage.

C. Solve challenge problem to demonstrate methodology to be used:

Steps	Application
1. Elicit that 49 cents means 49 hundredths of a dollar.	1. 49¢ = $.49
2. Elicit that 75 cents means 75 hundredths of a dollar.	2. 75¢ = $.75
3. Find the sum of $1.49 and $1.75.	3. $1.49 + 1.75 $3.24 cost of 2 records
4. To find the change, subtract the cost from the money given to pay for the item.	4. $5.00 3.24 $1.76 change

D. Do the adapted applications #1 and #2.

E. Do Application A in F.M. 1 Guide, page 134.

F. Do Adapted Applications 3 and 4.

G. Do Application B in F.M. 1 Guide, page 134.

H. Calculator application:

1. The teacher should review the correct procedure for entering this information into a calculator.

2. Stress with the students that dollar and cents values can be expressed on a calculator as whole numbers and decimal numbers for the purpose of solving a money problem. Demonstrate the use with problem #3 of Application B in the F.M. 1 Guide, page 134.

I. Do the Summary in the F.M. 1 Guide, page 134.

ADAPTED APPLICATIONS:

1. Change the following cent value numbers to dollar values:

a. 73¢
b. 9¢
c. 357¢
d. 26¢
e. 7153¢
f. 4¢
g. 80¢
h. 684¢
i. 2869¢

2. Change the following dollar value numbers to cent value numbers:

a. $ 6.51
b. $ 0.78
c. $49.86
d. $2.58
e. $0.06
f. $1.97
g. $96.43
h. $ 0.82
i. $0.01

3. How much change should you receive from the following purchases:

A. From a $5 bill for

1 slice of pizza at 75¢
1 can of soda at 60¢

B. From a $10 bill for

1 ballpoint pen at 55¢
1 assignment pad at 35¢
1 eraser at 25¢

C. From a $20 bill for

1 pair of designer jeans at $9.98
2 pairs of stockings at $3.99 each

D. From a $10 bill and a $20 bill for

2 pairs of Puma sneakers at $11.50 each
3 pairs of laces at 49¢ each

4. You are the cashier. How much change should you give a customer for the following purchases?

a. A man gives you a $10 bill to pay for $4.83 of candy.

b. A women buys $17.31 worth of perfume and lipstick and she gives you a $20 bill.

c. A young boy buys $2.55 worth of baseball cards with a $5 bill.

d. A girl gives you $2 to pay for a Menudo button worth $1.25.

e. A man gives you a $50 bill to pay for a box of cigars costing $22.50 and a cigarette lighter that costs $8.25.

Topic Two

THEME: To learn how to find the "best buy" in a supermarket by using the "unit prices."

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state the relationship between the solid units of measure of ounces and pounds.
- state the relationships among the liquid units of measure of ounces, pints, quarts and gallons.
- state the abbreviations used for the solid and liquid units of measure, e.g., oz., lb., pt., qt., gal.
- read and interpret samples of supermarket unit price shelf markers.
- compare the unit price shelf markers of similar products to determine which is the best buy.

VOCABULARY ADAPTATIONS:

REVIEW TERMS: ounces (fluid and solid), pound, compare
NEW TERMS: unit, comparison shopping, retail price

ADAPTATIONS FOR LESSON 2, F.M. 2, pp. 135-138.

CHALLENGE PROBLEM: You want to buy peanut butter for your mother. A 16 oz. jar of SKIPPY costs $1.50. A 32 oz. jar of JIF costs $2.90 and a 48 oz. jar of PETER PAN costs $4.80. Which one of the jars is the "BEST BUY?"

DEVELOPMENT:

A. It would be useful to use the challenge problem to discuss the idea of "comparison shopping." The teacher should explain that products in the store have both an actual price, which is the amount it costs, and a unit price, which shows you what the item costs per unit, which can be an ounce, a pound, a pint, a quart or a gallon. Explain to the class that a smart shopper should use the unit price to find out which product is the best buy. Demonstrate with the challenge problem using the following unit price stickers. Elicit all information from the students, reviewing that 16 ounces is equal to one pound:

PRODUCT	SIZE	ACTUAL PRICE	UNIT PRICE
Skippy Peanut Butter	16 oz. (1 pound)	$1.50	$1.50 per lb.
Jif Peanut Butter	32 oz. (2 lbs.)	$2.90	$1.45 per lb.
Peter Pan Peanut Butter	48 oz. (3 lbs.)	$4.80	$1.60 per lb.

From this chart ask which jar is the "better buy." Explain that while Skippy was the least expensive and Peter Pan was the largest jar, Jif was the cheapest per pound and thus the "BEST BUY."

B. Using the Challenge Problem and Developments #1, 2 and 3 in F.M. 1 Guide, pages 135-136, demonstrate the unit price method for liquid units of measure.

C. Some important facts to note for the students regarding unit pricing:

1. Items in stores will have retail prices, or the actual cost that you will pay for it, marked on them.

2. Many stores and supermarkets also have unit prices, or the cost per unit, such as pound or ounce, listed on the store shelf.

3. A smart shopper will use the unit price information to help find out which item is the "best buy."

4. Unit prices can help you pay less when you buy more.

5. The size of an item does not always determine which item is the "best buy." Many times a smaller item on sale will be the better buy. Sometimes the king-size product will cost more, but have a cheaper unit price and thus be the best buy.

6. Sometimes the actual price of an item is the same as the unit price. For example, milk may be 75¢ a quart. Thus, a quart container of milk will cost .75¢. But this does not happen all that often.

7. A smart shopper will think about other needs when shopping, such as: Do I need the large size? Do I like the taste of the less expensive item? And, is the better buy really as good as the more expensive item?

D. Do Adapted Application #1.

E. Do the applications in F.M. 1, page 137.

F. Do Adapted Application #2.

G. Do the summary in F.M. 1, page 138.

H. UNITS OF MEASURE CHART: The teacher should lead the class in developing this chart, which should then be displayed in the classroom with the charts that have been previously developed.

One (1) Pound (lb.) = Sixteen (16) ounces (oz.)
One (1) Pint (pt.) = Sixteen (16) fluid ounces (fl. oz.)
One (1) Quart (qt.) = Two (2) pints (pt.)
One (1) Quart (qt.) = Thirty-two (32) fluid ounces (fl. oz.)
One (1) Gallon (gal.) = Four (4) quarts (qt.)
One (1) Gallon (gal.) = One hundred twenty-eight (128) fluid ounces (fl. oz.)

ADAPTED APPLICATIONS:

1. Complete each of the following statements:

   a. 64 ounces = __________ pounds.
   b. 12 quarts = __________ gallons.
   c. 5 pints = __________ fluid ounces.
   d. 10 pounds = __________ ounces.
   e. 14 pints = __________ quarts.
   f. 96 ounces = __________ pounds.
   g. 24 pints = __________ gallons.
   h. 1 gallon = __________ ounces.
   i. 5 pounds = __________ ounces.
   j. 3 quarts = __________ pints.

2. Answer the following questions using the information below:

Party Pack - Only $11.99

Contents of this pack are:

a.	1 case of soda	- Original cost	$5.99
b.	1 box of pretzels	- Original cost	1.29
c.	1 bag of potato chips	- Original cost	.89
d.	1 carton of pop corn	- Original cost	1.59
e.	1 container of onion dip	- Original cost	1.19
f.	1 package of napkins	- Original cost	.95
g.	1 package of paper goods	- Original cost	2.49

1. What would the total cost of these items be if you bought them separately?

2. How much do you save by buying the whole Party Pack?

3. Suppose you do not need the paper goods. Would you still buy the pack, or the items separately?

4. You only need the soda, the paper goods, the pop corn, the pretzels and the potato chips. Should you buy them separately or buy the whole party pack?

Topic Three

THEME: To learn how to find out the actual price of an item from the unit price label.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state that one pound is equal in weight to 16 ounces.
- state that one ounce is $\frac{1}{16}$ of a pound.
- compute the product of two decimal numbers.
- round off decimal numbers to the nearest hundredth.
- round off money values to the nearest cent.
- state and apply the rule that actual price (cost) = unit price times weight (or quantity).
  C = U.P. x W. or C = U.P. x Q.

VOCABULARY ADAPTATIONS:

NEW TERMS: quantity, per
REVIEW TERMS: place value

ADAPTATIONS FOR LESSON 3, F.M. 1 guide, pp. 139-142.

CHALLENGE PROBLEM: Your mother sends you to the store to buy a pint of heavy cream to use to bake a cake. You see the unit price label and it reads $1.00 per quart. How much money should you give the cashier for the pint of cream?

DEVELOPMENT:

A. Discuss the challenge problem with the students. Elicit that 1 pint = $\frac{1}{2}$ quart.

Explain how a unit label looks. It would be most useful to display actual unit price labels from a store as a visual device for the students. Write the definition "per means for each" on the board. Elicit that $1.00 per quart means that you must pay $1.00 for each quart that you buy.

Solve the challenge problem on the board as follows:

1. 1 pint = $\frac{1}{2}$ quart
2. 1 quart costs $1.00; therefore the cost of 1 pint = $1.00 x $\frac{1}{2}$ or 1 pint = .50¢.

B. Do Development #2 in F.M. 1 Guide, page 140.

C. Review the rule for changing mixed numbers into improper fractions, as developed in Adapted Curriculum guide, Unit 2, Topic 12, page 93, Development E.

D. Do Adapted Application #1.

E. Do Development #3 and #4 in F.M. 1 Guide, page 140.

F. Review the concept of a decimal number as being part of a whole number. It is essential that the teacher emphasize the importance of the decimal point and how its position determines the place value of every numeral in that number. Review the place value chart found in the F.M. 1 Adapted Curriculum guide, Unit 3, Topic 1, Theme 2, page 137.

G. Do Adapted Application #2.

H. Introduce the concept of the multiplication of decimal numbers. Explain that we do not always buy even pound amounts, and that these items do not always cost even dollar amounts.

Use the example in Development #5, F.M.1 Guide, page 140. List the methodology on the chalkboard as follows:

Steps	Procedure
1. Set up multiplication as you would any other multiplication problem.	1. 1.89 x1.41
2. Multiply the two numbers.	2. 1.89 x1.41 189 756 189 26649
3. Count the number of decimal places in each of the two numbers being multiplied. and add them.	3. 1.89 has two decimal places. 1.41 has two decimal places. Thus, there are 4 decimal places in these two numbers.
4. There must be the same amount of decimal places in the product or answer to the problem.	4. The product is 26649. Thus if there are 4 decimal places in this product, the answer is 2.6649 (4 decimal places).

I. Ask the class if they could pay $2.6649 to a cashier. Elicit that we only pay in cents value up to the hundredth place value. Ask them what can be done to determine how much they should pay. Elicit the fact that the decimal number should be "rounded off" to the nearest hundredth in money values. Review this procedure first developed in the F.M. 1 Adapted Curriculum Guide, Unit 3, Topic 1, Theme 2, page 141.

DEMONSTRATE ON THE BOARD:

2.6649 - hundredth place is the "6" next to the "4". Since 4 is less than 5, the 4 and 9 are dropped and thus 2.6649 rounded off to the nearest hundredth is 2.66.

J. Do Adapted Application #3.

K. Do Applications B and C in F.M. 1 Guide, pp. 141-142.

SUMMARY:

1. Review the concepts of decimal place value, multiplication of decimal numbers and rounding off to the nearest hundredth.

2. Calculator Application: - to be used during discussion on multiplication of decimal numbers. This can be a good visual aid to display the placement of the decimal point in the answer.

   It may also be used to demonstrate that not all multiplication problems have to be rounded off.

   a. Have students enter 2.75 x 1.22 into the calculator. The answer displayed will be 3.355. Ask them why there are not 4 decimal places displayed. Elicit that when the 4th place (ten thousandths) is a zero it can be dropped. Recall that as many zeroes as are needed can be added to the right of a decimal fraction, likewise they may be dropped if they serve no purpose.

   b. Have the students enter 3.50 x 4.22 into the calculator. The answer displayed should be 14.77. Again ask them why only 2 decimal places are displayed. Elicit that the last 2 digits were zeroes and thus could be dropped.

3. Review the conversion of pounds and ounces.

4. Review the rule Actual Price (C) = Unit Price (U.P.) x weight (W) or Quantity (Q)

ADAPTED APPLICATIONS:

1. Convert the following mixed numbers into improper fractions:

   a. $2\frac{1}{2}$
   b. $3\frac{3}{4}$
   c. $1\frac{1}{8}$
   d. $2\frac{2}{3}$
   e. $5\frac{1}{4}$
   f. $4\frac{1}{2}$
   g. $7\frac{3}{4}$
   h. $3\frac{1}{3}$
   i. $4\frac{1}{8}$

2. What place value is each of the following underlined numerals?

a. $13.68\underline{5}2$
b. $7.\underline{9}1$
c. $257.3\underline{4}7$
d. $.897\underline{2}$
e. $5.9\underline{7}2$
f. $16.\underline{3}847$
g. $1.975\underline{2}$
h. $.83\underline{6}2$

3. Round off the following to the nearest hundredth.

a. 0.2857
b. 0.8391
c. 0.6942
d. 0.1629
e. 5.0261
f. 8.8728
g. 10.2036
h. 32.8871

Topic Four

THEME: To learn how to find the unit price of an item, when the actual price of that item is known.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- divide a decimal number by a whole number, and round off the answer to the nearest cent.
- divide a decimal number by another decimal number and round off the answer to the nearest hundredth.
- state and apply the rule that the unit price (U.P.) = the actual price divided by the weight or quantity.

U.P. = C ÷ W. or U.P. = C ÷ Q

VOCABULARY ADAPTATIONS:

REVIEW TERMS: place value, place holder

ADAPTATIONS FOR LESSON 4, F.M. 1 guide, pp. 143-145.

CHALLENGE PROBLEM: You buy 6 doughnuts at the bakery. You had to pay 90 cents for them. How much did you pay for each doughnut?

DEVELOPMENT:

A. Discuss the adapted challenge problem. Review the previous topic. Elicit that we had to multiply in order to find the actual price, or cost of an item. Try to help students realize that when we REVERSE the information given and what we are looking to compute, we also REVERSE the math operational skill we must use. Therefore, if we know the unit price and the quantity we multiply them to find the actual price, or cost. If however, we know the cost and the quantity, we will divide the cost by the weight or quantity to find the unit price. Solve the adapted challenge problem.

1. Six doughnuts cost .90¢

2. The cost or actual price is .90 and the quantity is 6.

3. Thus, to find the unit price we apply the rule:

   U.P. = C ÷ Q
   or
   U.P. = .90 ÷ 6

4. Solve the problem:

$$\begin{array}{r} .15 \\ 6\,\overline{).90} \\ \underline{6} \\ 30 \end{array}$$

Thus, 1 doughnut = .15¢

Sufficient emphasis should be placed upon the importance of the decimal point in the answer, and that it must be placed directly above the decimal point in the dividend.

B. Do the Challenge Problem and Developments #1 and 2 in the F.M. 1 Guide, pp. 143-145

NOTE: It is essential that time be spent reviewing the concept of dividing decimal numbers. The teacher should ascertain that the students understand the concept of moving the decimal point, in both the divisor and the dividend, an equal number of spaces to the right to convert them both into whole numbers.

Thus: 1. To convert 1.87 to a whole number we must move the decimal point two places to the right, so 1.87. = 187.

2. We must now convert 4.66 to a whole number also, so 4.66. = 466.

3. We may now proceed with the division by using two whole numbers.

C. Do the Summary in F.M. 1 Guide, p. 145.

D. Calculator exercise should be used during summary.

Topic Five

THEME: To learn how to find the weight of an item, when the actual price and the unit price of that item is known.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- divide two numbers, whole and decimal, and round off the answer to the nearest hundredth.
- state and apply the rule that the weight or quantity of an item is equal to the actual price, or cost divided by the unit price. $W(Q) = C \div U.P.$

VOCABULARY ADAPTATIONS:

REVIEW TERMS: decimal point, place value, per

ADAPTATIONS FOR LESSON 5, F.M. 1 guide, pp. 146-148.

CHALLENGE PROBLEM: Your mother sends you to the delicatessen to buy $5.00 worth of salami. You know that salami was on sale for $1.25 per pound. How much salami did you buy?

DEVELOPMENT:

A. Discuss the adapted challenge problem. It is important to emphasize to the students that there is a direct relationship between the weight or quantity of an item and its actual price and unit price.

B. Solve the adapted challenge problem on the board.

1. Salami has a unit price of $1.25 per pound.
2. You buy $5.00 worth of salami so the cost is $5.00
3. Weight = Cost ÷ Unit Price, so

   W = 5.00 ÷ 1.25, so

$$\begin{array}{r} 004. \\ \underset{\curvearrowright}{1.25.}\overline{)\underset{\curvearrowright}{5.00.}} \\ \underline{5\ 00} \\ 0 \end{array}$$

Therefore, the weight is 4 pounds.

NOTE: You should use this problem to review and reinforce the concept of the importance of the decimal point, and converting decimal numbers to whole numbers by movement of the decimal point to the right.

This is also a good opportunity to reinforce the concept of estimating the answer to a long division problem. For example, using this problem, ask the students to estimate an answer by comparing the first digit in the numbers being divided. Since 1 can divide into 5 only 5 times, it can be estimated that the answer must be less than 5, and thus 4 would be a good number to start with.

C. Do Development #2 in F.M. 1 Guide, p. 146.

D. Do the challenge problem in F.M. 1 Guide, p. 145.

E. Do the applications in F.M. 1 Guide, pp. 145-146.

SUMMARY:

1. Review the division of decimal numbers.

2. Review the conversion of decimal numbers into whole numbers by movement of the decimal point to the right.

3. Review the concept of estimating an answer in long division problems by comparing the first digits in the numbers.

4. Review rounding off to the nearest hundredth.

5. Calculator Exercise: To be used to reinforce the rule: W (weight) or Q (quantity) = C (actual cost) ÷ U.P. (unit price).

   a. Students should enter the information for the following problem into the calculator:

      "Chopped meat costs .88¢ per pound. You pay $2.20 for a package of this meat. How heavy is that package?"

   b. Review W = C ÷ U.P. so W = 2.20 ÷ .88.

   c. Have students enter 2.20 ÷ .88 without converting to whole numbers.

   d. Correct answer should be displayed as 2.5, so that you would have bought $2\frac{1}{2}$ pounds of chopped meat.

6. Other problems may be given to reinforce both the rule and the CORRECT use of the calculator.

Topic Six

THEME: To reinforce the relationship between the weight or quantity of an item, the actual price or cost of that item and the unit price of that item.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state the relationship between pints, quarts and gallons.
- state the relationship between ounces and pounds.
- find the actual price of an item, when given the unit price and quantity of that item.
- find the unit price of an item, when given the actual price and quantity of that item.
- find the quantity of an item, when given the actual price and the unit price of that item.

ADAPTATIONS FOR LESSON 6, F.M. 1 guide, pp. 149-150.

CHALLENGE PROBLEM: You go to the store to buy the following items:

1. A gallon of orange juice, when the unit price is $1.10 per quart. How much does the gallon of juice cost?

2. 24 ounces of hot dogs that cost $1.35. What is the unit price per pound for the hot dogs?

3. A package of bologna that costs $3.75. The unit price is $1.50 per pound. How much bologna is in the package?

DEVELOPMENT:

A. This topic should be used as a review unit for the concepts that have been introduced in Topics 1 through 5. The applications from the previous topics should be used to develop a unit test. Some examples will be introduced in this unit, and should be used as examples that the teacher can utilize to develop further problems.

B. Discuss the adapted challenge problem. Note that each item has missing information. Review the relationship among the unit price, the actual price and the quantity of an item.

C. Develop the following wall chart:

1. ACTUAL PRICE (cost) = UNIT PRICE x QUANTITY or WEIGHT
   $C = U.P. \times Q$ or $C = U.P. \times W$

2. UNIT PRICE = ACTUAL PRICE (cost) ÷ QUANTITY or WEIGHT
   $U.P. = \frac{C}{Q}$ or $U.P. = \frac{C}{W}$

3. QUANTITY or WEIGHT = ACTUAL PRICE (cost) ÷ UNIT PRICE
   $Q = \frac{C}{U.P.}$ or $W = \frac{C}{U.P.}$

D. Elicit from students which rule should be applied for each of the items in the adapted challenge problem.

Solve each of the problems on the chalkboard:

1. Orange juice is $1.10 per quart. How much is 1 gallon?

   1 gallon = 4 quarts; thus

   actual cost : unit price x quantity, or
   C : $1.10 x 4, thus
   C : $4.40

2. 24 ounces of hot dogs cost $1.35. What do they cost per pound?

   16 ounces = 1 pound, thus
   24 ounces = 1.5 pounds

```
      1.5
   16)24.0
      16
       80
       80
        0
```

   Thus, unit price = 1.35 ÷ 1.50

```
U.P. =           .90
         1.50.)1.35.00
               1 35 0
                   00
```

   Thus the unit price for the hot dogs was .90¢ per pound.

3. Bologna has a unit price of 1.50 per pound. What quantity costs $3.75?

   Quantity = actual price ÷ unit price, thus

```
Q =          2.5
     1.50.)3.75.0
           3 00
             750
             750
```

   Thus, you would buy 2.5 pounds of bologna.

E. Do Development #1, and Application A and B in F.M. 1 Guide, pp. 149-150.

NOTE: 1. These applications and all others developed in Topics 1 through 5 can be used to develop questions for a unit test.

2. Calculator exercises should be utilized extensively throughout these topics. The concepts taught are difficult and require many different math computational skills.

The calculator may be used to reinforce the concepts and skills, as well as visually demonstrate the importance of the decimal point in monetary value.

3. It is recommended that the teacher incorporate as many actual items, unit price labels, and newspaper ads as possible to personalize the concepts for the students.

4. Homework assignments might include actual shopping experiences in the stores and supermarkets.

Topic Seven

THEME: To learn how to find the amount of a salary that is based on an hourly wage.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- determine the total hours worked in a specific pay-period, i.e., week.
- define "gross wage."
- compute a gross wage by multiplying the number of hours worked by the hourly wage.
- complete a payroll table containing only regular hour wages to determine a total for all the workers' wages.

VOCABULARY ADAPTATIONS:

NEW TERMS:	hourly wage, salary, pay-period, deductions
REVIEW TERMS:	per

ADAPTATIONS FOR LESSON 7, F.M. 1 guide, pp. 151-152.

CHALLENGE PROBLEM: Maria works as a cashier in the local supermarket as a part-time worker after school. She works 2 hours every Monday, Tuesday, Thursday and Friday. She also works 7 hours on Saturday. Her hourly wage is $3.50. How much is her total salary for every week that she works?

DEVELOPMENT:

A. Using the challenge problem. have a discussion on the importance of being able to determine how much money you earn when you work. Explain that many people are paid a salary based upon an hourly wage. This means that the person is paid a definite amount for each hour that the person works. It would be helpful to discuss any real job situation that a student in class might be working in.

Elicit from the class that most paychecks include deductions, or money taken from the amount earned, for taxes and union dues. The amount of money earned before these deductions is known as gross wage.

B. Solve the challenge problem. Introduce the rule that: GROSS WAGES = the number of hours worked x the hourly wage. Thus, for Maria, we must first determine the number of hours she worked in the week. Most people get paid for each week's work, known as the WEEKLY pay-period. Maria's weekly hours are:

Monday	- 2 hours
Tuesday	- 2 hours
Thursday	- 2 hours
Friday	- 2 hours
Saturday	- 7 hours
Weekly total	- 15 hours

Thus, Maria's weekly gross wage is: 15 hours x 3.50 per hour = $52.50.

C. Do the challenge problem in F.M. 1 Guide, p. 151.

D. Put the following problem on the chalkboard:

Pedro works as a stockman at the supermarket. He works the following hours during the week: Monday $2\frac{1}{2}$ hours, Tuesday $1\frac{1}{4}$ hours, Wednesday 2 hours, Thursday $1\frac{3}{4}$ hours, Saturday 6 hours. If Pedro earns $3.50 per hour, what is his salary for the weekly pay period?

It will be necessary at this time to review the conversion of fractions into decimal numbers. Remind the students to divide the denominator into the numerator. Solve the problems on the chalkboard as follows:

```
1   =     .5 ;        1    .25;     3  =     .75
-                     -             -
2      2)1.0          4  4)1.00     4      4)3.00
         1 0               8                 2 8
         ---             ----              -----
           0              20                  20
                         ----              -----
                            0                  0
```

Now, we may determine how many hours Pedro worked as follows:

```
Monday    - 2.5
Tuesday   - 1.25
Wednesday - 2.0
Thursday  - 1.75
Saturday  - 6.0
          -----
           13.50
```

Now, we may find Pedro's weekly gross wage as follows:
gross wage = 13.50 x 3.50, or,

```
  13.50
 x 3.50
 ------
  67500
 4050
 ------
47.2500 = $47.25
```

<u>NOTE:</u> It will be helpful to review the multiplication of decimal numbers and the proper placement of the decimal point in the answer, as first developed in Topic 3 earlier in this unit.

E. Do Adapted Application #1.

F. Do Application A, F.M. 1 Guide, pp. 151-152.

G. Omit the Cliff-Hanger, F.M. 1 Guide, p. 152.

SUMMARY:

1. Review the rule for computing gross wages as:

   Gross Wage = number of hours worked x hourly wage.

2. Review the conversion of fractions into decimal numbers.

3. Review the multiplication of decimal numbers, with emphasis on the proper placement of the decimal point in the answer.

4. Calculator Exercise: It would be useful to have the students solve the following problem by entering the necessary information into the calculator.

"Mathew worked $2\frac{3}{4}$, 3, $4\frac{1}{2}$, $1\frac{1}{4}$ and $3\frac{1}{4}$ hours during the week. He earns $3.75 per hour. How much salary did he earn during the week?

a. Have the students convert the fractions to decimal numbers by entering:

   1. 3 ÷ 4 = (display 0.75)
   2. 1 ÷ 2 = (display 0.5)
   3. 1 ÷ 4 = (display 0.25)

b. Have the students determine the total hours worked by entering:

   2.75 + 3 + 4.5 + 1.75 + 3.25 = (display 15.25)

c. Have the students determine the gross wage by entering:

   15.25 x 3.75 = (display 57.1875)

d. Review rounding off the nearest cent - .1875 rounded off is .19 because "7" in the thousandths place is greater than 5, thus 8 becomes 9.

Thus, the answer to the problem is $57.19.

Additional problems may be given to concretize the concepts, and correct use of the calculator.

ADAPTED APPLICATIONS:

A. Convert each fraction into a decimal number:

1. $\frac{1}{2}$
2. $\frac{3}{5}$
3. $\frac{2}{3}$
4. $\frac{3}{10}$
5. $\frac{5}{8}$
6. $\frac{3}{4}$
7. $\frac{1}{6}$
8. $\frac{4}{7}$
9. $\frac{7}{9}$

Topic Eight

THEME: To learn how to read a time card to determine the number of hours worked in a weekly pay-period.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- state that hours running from 12 midnight to 12 noon are known as A.M. hours.
- state that hours running from 12 noon to 12 midnight are known as P.M. hours.
- determine the number of A.M. hours worked from the clock times on a time card.
- determine the number of P.M. hours worked from the clock times on a time card.
- determine the total number of hours worked between two given clock times, including A.M. and P.M. times.

VOCABULARY ADAPTATIONS:

REVIEW TERMS: hourly wage, gross wage

ADAPTATIONS FOR LESSON 8, F.M. 1 guide, pp. 153-155.

DEVELOPMENT:

A. Discuss the cliff-hanger at the end of Lesson 7, F.M. 1 Guide, page 152. Follow the development #1 in the F.M. 1 Guide, page 153. Place proper emphasis on the concept of A.M. and P.M. hours, and how to determine the amount of hours worked in each time frame to determine the correct total of hours that were worked. Do not have the students convert the mixed number to an improper fraction to determine the gross wage. Rather, convert the hours to a decimal number and then multiply in order to determine the gross wage.

Thus, $7 \frac{1}{2}$ hours = 7.5 hours, so that 7.5 x 4.5 = $33.75.
(This may be used as a calculator exercise.)

B. Discuss the challenge problem in F.M. 1, page 153. Follow the development #2 in F.M. 1 Guide, page 154. Place sufficient emphasis on the concept of converting 1 hour into 60 minutes for the purpose of determining the number of hours worked, when the time changes either from A.M. hours to P.M. hours, or P.M. hours to A.M. hours.

C. Do Application A in F.M. 1 Guide, page 155. Additional problems may be given to concretize the concepts of conversion from A.M. to P.M. hours, and P.M. to A.M. hours.

D. Follow Development #4, F.M. 1 Guide, page 154. It will be essential to emphasize for the student that it is necessary to delay converting minutes into hours until all work is completed. Only then can any minutes total over 60 minutes be converted into hours.

E. Do Application B, in F.M. 1 Guide, page 155.

SUMMARY:

1. Review the concept of A.M. and P.M. hours
2. Review the conversion of noon (12 P.M.) and midnight (12 A.M.) to 11 hours and 60 minutes for the purpose of determining total hours worked when the time period changes from A.M. to P.M. hours, or P.M. to A.M. hours.
3. Calculator exercises should be included for all concepts taught.

Topic Nine

THEME: To learn how to find the amount of a salary that is based on both regular hourly and overtime wages.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- determine the difference between "regular" work hours and "overtime" work hours.
- determine the total number of a worker's overtime hours.
- compute a worker's hourly overtime wage by multiplying 1.5 and the regular hourly wage.
- compute a total gross wage that contains both regular and overtime wages.
- complete a payroll table, which includes time and a half overtime pay, to determine a total for all of the worker's wages.

ADAPTATIONS FOR LESSON 9, F.M. 1 guide, pp. 156-158.

CHALLENGE PROBLEM: Cindy works as a typist for the local bank. Her regular work hours are Monday through Friday, from 9 A.M. to 5 P.M., with one non-paid lunch hour each day. Her hourly wage is $4.20 per hour. Any hours that Cindy works over her regular hours she is paid overtime wages, or one and $\frac{1}{2}$ her regular hourly wage.

What is her gross regular wage each week?
What is her hourly overtime wage?
What is her total gross wage if she worked 5 overtime hours one week?

DEVELOPMENT:

A. Discuss the challenge problem. Review the concepts of regular hourly wages, determining total hours worked, and computing regular gross wages.

B. Elicit that Cindy works 7 hours per day, 5 days a week for a total of 35 regular hours per week, on the chalkboard:

	A.M.	P.M.	Total Work Day
	12 hrs. 00 min	5 hrs. 00 min	A.M. - 3 hrs.
	- 9 hrs. 00 min	- 0 hrs. 00 min (noon)	P.M. - 5 hrs.
Total:	3 hrs. 00 min	5 hrs. 00 min	8 hrs.
			non-paid lunch - 1 hr.
			7 hrs. a day

7 hours a day x 5 days a week = 35 hours weekly.

C. Elicit that the rule to compute regular gross wage is regular hourly wage multiplied by the number of regular hours worked. Thus, for Cindy, her total regular gross wage would be computed as:

$4.20 x 35 hours = $147.00

NOTE: Calculator usage may be beneficial during the computational process.

D. Introduce the rule that the overtime hourly wage can be computed by multiplying the regular hourly wage times 1.5, in that overtime wages are usually paid by "time and a half" rates. Thus, Cindy's overtime hourly wage would be computed as:

Overtime hourly wage = regular hourly wage x 1.5
= $4.20 x 1.5
= $6.30

Referring to the challenge problem, Cindy worked 5 overtime hours; thus her overtime wages would be computed as:

Overtime gross wages = number of overtime hours x overtime hourly wage
= 5 x $6.30
= $31.50

E. We can determine Cindy's total gross wages by adding her regular wages with her overtime gross wages. Thus Cindy's total gross wages would be computed as:

Total gross wages = regular gross wages + overtime gross wages
= $147.00 + $31.50
= $178.50

F. Do Application A, F.M. 1 Guide, p. 157.

G. Do Development #3, and Application B in F.M. 1 Guide, pp. 156-157.

SUMMARY:

1. Review the method of computing total number of hours worked, including both A.M. and P.M. hours.
2. Review the rule for computing regular gross wage.
3. Review the rule for computing overtime hourly wage.
4. Review the rules for computing overtime gross wage and total gross wages.

5. Calculator Exercise: Have the students enter the correct information to obtain the answers to the following questions:

   a. Scott works Mondays, Tuesdays and Thursdays from 10:30 A.M. to 3:15 P.M., and Saturdays from 8:30 A.M. to 4:30 P.M. How many hours a week does Scott work?

   b. Debbie works 15 $\frac{1}{2}$ hours a week. Her regular hourly wage is $3.30. What is her regular gross wage?

   c. Pat's regular hourly wage is $3.80. What is his overtime hourly wage if it is paid as "time and a half?"

   d. Diana's regular hourly wage is $3.90. If she is paid "time and a half" overtime wages, what would her overtime gross wage be if she worked 18 overtime hours?

   e. Marc's regular work week is 35 hours, and his regular hourly wage is $5.50. He is paid "time and a half" for overtime work. What are his total gross wages if he works 47 $\frac{1}{2}$ hours?

Topic Ten

THEME: To learn how to find the salary of a worker that is based on piece-work or a piece-rate plan.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define and give examples of jobs that have salaries based on piece-work or a "piece-rate" plan.
- compute a piece-work salary by multiplying the number of pieces finished by the rate of pay for each piece, then adding the total for each group.
- complete a payroll table where the workers are paid by the piece.

ADAPTATIONS FOR LESSON 10, F.M. 1 guide, pp. 159-160.

DEVELOPMENT:

A. Use the challenge problem in the F.M. 1 guide, page 159. Follow the development #1 on page 159.

B. Do Application A, F.M. 1 guide, page 160.

C. Do Development #3 and 4, and Application B in F.M. 1 guide, pages 159-160.

SUMMARY:

1. Review the method to compute salary based on a piece-rate plan.

2. Calculator exercise: Have the students enter the correct information into the calculators to determine the answers to the following problems:

   a. Ralph works in a T.V. tube factory. He is paid .70¢ for every tube completed. During one week Ralph completed the following pieces: Monday - 63, Tuesday - 59, Wednesday - 68, Thursday - 61, Friday - 57. What is Ralph's total gross wages for the week?

   b. Jackie makes sweater belts. She is paid at the following rate for each:

      1. 50 pieces or less - .49¢ each
      2. 51 to 70 pieces - .55¢ each
      3. 71 to 90 pieces - .60¢ each
      4. 91 pieces and over - .69¢ each

      What are her total daily gross wages for the following week?

      Monday - 74 pieces
      Tuesday - 98 pieces
      Wednesday - 46 pieces
      Thursday - 67 pieces
      Friday - 83 pieces

Topic Eleven

THEME: To learn how to find the total cost of an item that is purchased on the installment plan.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define what it means to purchase an item on the "installment plan."
- discuss some of the advantages and some of the disadvantages of using the installment plan to purchase items.
- determine the total cost of an item purchased on the installment plan by applying the rule that total cost is equal to the down payment plus the number of installment payments times the amount of each installment payment.
- determine the finance charge of an item purchased on the installment plan by applying the rule that the total cost minus the original cash price is equal to the finance charge.

VOCABULARY ADAPTATIONS:

REVIEW TERMS: product, per

ADAPTATIONS FOR LESSON 11, F.M. 1 guide, pp. 161-162.

CHALLENGE PROBLEM: James wants to buy a three-speed bicycle. He sees one in the store that normally sells for $300 but is on sale for $200. James only has $100 at this time. The store owner says that he can buy the bicycle now for the $100 down and 5 monthly payments of $35. Should James buy the bicycle on the installment plan now?

DEVELOPMENT:

A. Discuss the adapted challenge problem with the students. A discussion should be held on the concept of "buying on time." Some of the advantages to this method, such as: using a product while paying for it, buying while it is on sale, purchasing large items that you could not otherwise afford, should be elicited.

Likewise the disadvantage of paying a higher total cost than the cash price should also be discussed. The students should become aware that they must consider both the advantages and disadvantages to buying on the installment plan before doing so.

B. Solve the challenge problem. Elicit a method of figuring the total cost that James would have to pay for the bicycle on the installment plan. List the rule on the chalkboard as follows:

Total Cost = Down Payment + number of installments x amount per installment. Thus, for James' bicycle, it would be computed as follows:

Total cost = \$100 + 5 x 35
= \$100 + \$175
= \$275

NOTE: Review the method for correct order of operations from Unit 1, Topic 3.

C. Elicit that the total cost of \$275 is more than the original cash price of \$200. A discussion should be held on why a store charges more for the installment plan. The students should realize that this extra money, or finance charge, is to pay the merchant for the interest on the money that is owed to him and the extra cost for him to do business this way.

List the rule on the chalkboard as follows:

Finance Charge = Total Cost - Original Cash Price.

Thus, for James' bicycle, it would be computed as follows:

Finance Charge = \$275 - 200
= \$ 75

D. Finally, for James' bicycle, elicit that he should buy the bicycle on the installment plan at this time. Even though the finance charge is \$75, the total cost of \$275 is still less than the non-sale price of \$300 by \$25.

Elicit that if he waits until he has the full amount, it may no longer be on sale, and thus, he would have to pay more for it later.

E. Do Applications A, B and C in the F.M. 1 guide, page 162.

F. Do Adapted Applications A and B.

SUMMARY:

1. Review the vocabulary of installment buying.
2. Review the rule for determining the total cost of installment plan purchases.
3. Review the rule for determining the finance charge on installment plan purchases.
4. Calculator Exercise: The teacher should provide problems for the student to enter into the calculator to concretize the rules for determining total cost and finance charge. It should also help to reinforce the correct order of operations.

Thus, for the total cost students must perform the multiplication first, then the addition. Demonstrate the correct method and the incorrect method.

Correct: 100 + 5 x 35 = $275.00 [multiplication first]
Incorrect: 100 + 5 x 35 = $3,675.00 (quite a difference!) [addition first]

5. Omit the Cliff-hanger, F.M. 1 guide, page 162.

ADAPTED APPLICATIONS::

Find the total cost and the finance charge for the following installment purchases:

Item Purchased	Cash Price	Down Payment	Installment Payment	Number of Installments	Total Cost	Finance Charge
1. Stereo System	$ 700	$ 200	$ 75	8		
2. Yamaha Motorcycle	$1,250	$ 500	$ 90	11		
3. Color T.V. Set	$ 499	$ 125	$ 85	6		
4. Drum Set	$ 849	$ 230	$ 87	9		
5. Corvette Sports Car	$7,459	$2,000	$200	36		

B. Find the missing item for each of the following purchases:

Item Purchased	Cash Price	Down Payment	Installment Payment	Number of Installments	Total Cost	Finance Charge
1. Air Conditioner	$349	$100	$60	$460		
2. Electric Guitar	$250	$ 80		8		$ 70
3. Portable Cassette Deck		$150	$20	15		$ 70
4. Video Recorder System	$799		$80	10		$150

Topic Twelve

THEME: To learn how to find out the price of payments that are based on a step function.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define what it means to pay for products on a "sliding scale," or "step function" basis.
- discuss some examples of every-day purchases and services that use "step function" price levels.
- compute the cost for each step in a "step function" purchase.
- determine the number of units, or weight at each price level.
- compute the total cost of a step function by applying the rule that the total cost equals the sum of the initial charge and the product of each unit rate times the number of units at that rate.

VOCABULARY ADAPTATIONS:

REVIEW TERMS: product, per, units

ADAPTATIONS FOR LESSON 12, F.M. 1 guide, pp. 163-164.

DEVELOPMENT:

A. Discuss the challenge problem in the F.M. 1 guide, page 163. Recall that in Topic 10, on PIECE-RATE salary, examples were given how a worker was often paid more for each piece that was completed over a certain amount as a "bonus" to work harder. Many companies or service providers will charge you lower rates for the more you buy, or use, as a "bonus" to have you buy, or use more of their product or service.

B. Elicit examples of "step function" purchases and services, such as the post office, public utilities such as gas, electric and telephone, and taxicabs.

C. Solve the challenge problem in F.M. 1, page 163.

NOTE: Again, it is essential that the teacher reinforce the concept of the correct order of operations. You may wish to do this as a Calculator Exercise to reinforce the concepts.

D. Do Applications A and B in F.M. 1, page 164.

SUMMARY:

1. Review the concept of sliding scale or step function payments.

2. Review the rule for computing step function payments.

3. Provide further applications and calculator exercises on step function payments.

UNIT VI — PROBABILITY AND STATISTICS

INTRODUCTION

The major computational concepts introduced and developed in Unit VI are those of equivalent fractions, conversion of fractions to a decimal number or to a percentage, and changing a decimal number to a percentage. As before, the four basic math computational operations will also be reinforced.

The emphasis of this unit is on new concepts - the basic understanding of probability and statistics, and the organization and the interpretation of given data. These concepts are introduced using everyday situations, and are presented in their simplest form.

There is no great need to emphasize the concept of "sample space" in Topics 9, 10, and 11. Rather, this concept may be used to reinforce the computational skills and the previously learned concepts of fractions, decimals, and percents which are necessary to pass the R.C.T. exam. There is also no opportunity to introduce new calculator applications in this unit.

The teacher should also note that individual topic tests are not called for, but instead there are tests included at the end of Topics 5, 8 and 11 to finalize all concepts learned in Unit VI.

Topic One

THEME: To learn that statistics is the science of collecting, organizing and interpreting data.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define the words data and statistician.
- interpret information from statistical tables.

ADAPTATIONS FOR LESSON 1, Unit IV, F.M. 1, pp. 167-168.

DEVELOPMENT:

A. Do Development L, F.M. 1, pp 167-168

B. Add definitions: 1. Data - numerical facts
2. Statistician - a person that works with data

C. Do adapted applications 1, 2 and 3.

ADAPTED APPLICATIONS:

Answer the questions following the statistical tables:

1.

Weather in Foreign Cities, May 1, 19__

City	Temperature	Skies
Amsterdam	58	Cloudy
Beirut	73	Clear
Dublin	49	Cloudy
Jerusalem	74	Clear
Madrid	59	Partly Cloudy
Peking	54	Cloudy
Tokyo	58	Cloudy
Toronto	50	Showers
Warsaw	58	Cloudy

a. Which city had the lowest temperature?

b. Which cities had the same temperature?

c. Which city had the warmest temperature?

d. Which cities had clear skies?

2.

YANKEES' BATTING RECORD, MAY 1, 1983

Player	At Bat	Hits	Home Runs	Runs Batted In	Batting Average
Murcer	3	1	0	0	.333
Griffey	65	20	2	3	.308
Piniella	13	4	0	1	.308
Baylor	64	19	2	9	.297
Mattingly	7	2	0	2	.286
Robertson	25	7	1	1	.280
Winfield	71	19	4	12	.268
Randolph	74	20	0	6	.263
Nettles	55	14	1	6	.255
Smalley	72	18	3	7	.250
Mumphrey	46	11	0	6	.239
Kemp	69	15	3	11	.217
Cerone	33	7	0	3	.212
Gamble	6	1	0	0	.167

a. Which player was at bat the most times?

b. Which player had the most home runs?

c. Which players had the same batting average?

d. Which player had the most hits?

e. What number appears most often on the table?

3.

MOST ACTIVE STOCKS IN THE NEW YORK STOCK EXCHANGE - WEEK ENDING APRIL 22, 1983

Company	Sales	Last Price	Net Change
American Motors	$6,339,600	8	+ $1\frac{1}{2}$
ATT	6,408,100	$66\frac{1}{4}$	- $\frac{3}{8}$
Chrysler	7,724,200	$25\frac{1}{4}$	+ $4\frac{7}{8}$
Exxon	4,367,000	$33\frac{1}{4}$	+ $\frac{1}{4}$
General Motors	3,595,700	$65\frac{3}{8}$	+ $1\frac{5}{8}$
IBM	4,800,000	$117\frac{1}{4}$	+ $7\frac{1}{8}$
Pepsi Cola	3,802,900	$39\frac{3}{4}$	+ $4\frac{1}{4}$
RCA	4,129,000	$25\frac{5}{8}$	+ $2\frac{5}{8}$
Sears	4,055,800	$39\frac{5}{8}$	+ $\frac{5}{8}$

a. Which company had the largest amount of sales?

b. Which company had the largest net change for the week?

c. What was the highest last price of all of the above companies?

d. Which company had the lowest amount of sales?

SUMMARY:

1. A person who works with data is called a ______________________________

2. The science of collecting, organizing and interpreting data is called ___ ____________________?

3. List 3 types of jobs that involve the use of statistics.

a. ____

b. ____

c. ____

NOTE: A test for Topic 1 is not indicated.

Topic Two

THEME: To learn how to organize and interpret statistical data using a frequency table.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define tally.
- organize the data in decreasing order with the largest number first.
- assign tally marks to each number of items.
- check by totaling the frequency numbers and the number of items in the given set of data.

ADAPTATIONS FOR LESSON 2, F.M. 1, pp. 169-171.

DEVELOPMENT:

A. Do Development 1, F.M. 1, pages 169-170.

B. Prior to Development 2, define the following:

tally -	Each item in a set of data is assigned a vertical mark (|). To simplify counting, every fifth tally is written as a horizontal mark passing through four tallies. (𝍸)
frequency -	The tally marks are converted into a counting number. Each counting number tells how often each item occurs. The counting number is called the frequency.
frequency table -	A chart of data organized or grouped into an ordered presentation. Use frequency table in development 2, page 170, F.M. 1 to elicit above definitions. Emphasize that table starts with lowest number and ends with highest number.

C. Proceed to Developments number 3 and 4, F.M. 1, page 171.

D. Do adapted applications 1, 2 and 3.

ADAPTED APPLICATIONS:

1. Construct a frequency table for each of the following sets of data:

    a. 6, 5, 7, 4, 8, 9, 5, 6, 7, 8, 7, 4, 8, 9, 8

    b. 9, 8, 4, 6, 8, 7, 5, 4, 9, 8, 7, 6, 5, 8, 3

    c. 7, 6, 8, 6, 9, 6, 9, 9, 7, 6, 7, 6, 7, 8, 8, 6, 4, 8, 6, 8, 7

    d. 54m, 53m, 52m, 51m, 54m, 55m, 56m, 52m, 54m, 51m, 51m, 54m, 54m

2. A weatherman recorded the temperature at different times throughout the day. Use the following set of data and arrange the temperatures into a frequency table:

   50°, 55°, 60°, 65°, 60°, 55°, 50°, 60°, 55°, 60°,
   65°, 60°

3. Mary took many math tests during the school year. The following set of data represents her grades for the year:

   85, 87, 90, 85, 80, 90, 85, 92, 90, 75, 85, 90

   Arrange the data into a frequency table.

SUMMARY:

Have students copy the following information into their notebooks as a reference for developing a frequency table to use as a reference model.

1. Organize the data in decreasing order with the largest number first.
2. Assign tally marks to each set.
3. Find the frequency number for each item.
4. Check by totaling the frequency numbers and the number of items in the given set of data.

NOTE: A test on Topic 2 is not indicated at this point.

Topic Three

THEME: To learn how to find the mode through the interpretation of data.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- define mode.
- identify the mode from frequency tables, including the class survey data table.
- define bimodality.

ADAPTATIONS FOR LESSON 3, F.M. 1, pp. 172-173

NOTE: No adaptations are required for the teaching of this lesson. Follow F.M. 1 guide. Additional applications are included to give the students practice in finding the mode through the interpretation of data.

ADAPTED APPLICATIONS:

1. Find the mode for the following group of numbers:

   2, 3, 4, 2, 5, 2, 8, 6

2. The ages of the teachers in the social studies department of a high school are: 35, 51, 41, 39, 46, 41, 26, 47, 27, 37. Find the mode.

3. The weekly salaries for the employees at a department store are: $285, $372, $125, $180, $150, $285, and $213. What was the mode?

4. The players on a baseball team have the following years of experience: 8, 5, 6, 10, 12, 5, 4, 7, 6, 7, 4, 2, 7, 1, 2, 3, 10, 1, 7, 5, 4, 10.

   a. Set up a frequency table
   b. Find the mode

5. a. Set up a frequency table to represent the number of consonants in the following sentence:

   MATHEMATICS CAN BE FUN, SOMETIMES!

   b. Using the data collected and recorded, fine the mode.

NOTE: Test not indicated for this topic.

Topic Four

THEME: To learn how to find the mean through the interpretation of data.

NOTE: No adaptations or additional applications are necessary for the teaching of this topic. Follow F.M. 1, pages 174-175. A more detailed summary has been added as a reference for the students.

SUMMARY:

Have the students copy into their notebooks the following steps necessary to find the mean from a given set of data:

1. Find the sum of the items.
2. Divide the sum by the number of items.
3. The quotient will be the mean or average.

NOTE: A test on Topic 4 is not indicated.

Topic Five

THEME: To learn how to find the median through the interpretation of data.

NOTE: No adaptations or additional applications are necessary for the teaching of this topic. Follow F.M. 1, pages 176-178. A more detailed summary has been added as a reference for the students.

SUMMARY:

Have students copy into their notebooks the rules for finding the median of an odd set of data and an even set of data as follows:

Odd Set of Data

1. Arrange the data in numerical order.
2. Find the number that is in the middle.
3. The middle number is the median.

Even Set of Data

1. Arrange the data in numerical order.
2. Find the two middle numbers.
3. Find the average of the two middle numbers. (Review finding averages.)
4. The average of the two middle numbers is the median.

NOTE: A visual aid chart should be developed at this time for display in the classroom entitled "The Three M's."

mode - number repeated most often
mean - average
median - middle number

This will serve as a reference for the students so that they will not confuse the three terms.

SUGGESTED TEST FOR TOPICS 1-5

NAME: ______________________________

PART I:

1. Denise took many social studies tests during the school year. The following set of data represents her grades for the year:

   90, 85, 87, 85, 90, 80, 85, 90, 92, 75, 85.

   Arrange the data into a frequency table.

Grade	Tally	Frequency

2. Find the mode for the data above.
3. Find the median for the data above.
4. Find the mean for the data above.
5. Andrew got his report card at the end of the term. His grades were:

Math	90%
English	85%
Social studies	80%
Science	91%
Music	75%

What was his average for the term?

Part II: Use the following words to fill in the blanks below:

data statistics tally mean mode median

1. Another word for average is ____________________.
2. A vertical mark showing each item in a set of data is called a ____________________.
3. Middle value in a set of data is the ____________________.
4. ____________________ is the science of collecting, organizing and interpreting data.
5. Numerical facts can be called ____________________.

Topic Six

THEME: To learn about probability as the science of chance.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

. define probability.

ADAPTATIONS FOR LESSON 6, F.M. 2, pp. 179-181.

CHALLENGE PROBLEM: Tom, Jose, and Mike play a game with marbles. They put 1 black marble and 1 white marble in a box. They shake the box and take out a marble and record the result (black or white). They put the marble back, shake the box and draw a marble again. The winner is determined by the following:

Tom - if he gets 2 black marbles.
Jose - if he gets 2 white marbles.
Mike - if he gets 1 black and 1 white marble.

Who has the best chance of winning?

DEVELOPMENT:

A. Follow development 1 in F.M. 1, page 179.

B. Define probability as the science of chance and that the chance of a particular event occuring is called the probability of the event.

C. Proceed to elicit answers to the challenge problem. Pose the following questions:

1. What are the possible outcomes of the picks?

   Answer: black - black
   white - white
   black - white
   white - black

2. What are the chances of Tom winning? Jose winning? Mike winning?

   Answer: Tom's chance of winning are 1 out of 4, since there is only 1 chance of picking 2 blacks out of 4 possible outcomes.

   Jose's chance of winning are 1 chance out of 4, since there is only 1 chance of picking 2 whites out of 4 possible outcomes.

   Mike's chance of winning are 2 out of 4 since there are 2 chances of picking a white and black out of 4 possible outcomes.

3. Which boy has the best chance of winning the game? Why?

   Answer: Mike. He has the best chance of winning since he has 2 ways of winning. Each of the other two boys only has one way of winning.

4. Proceed to development 2, F.M. 1, page 179 and Experiments I and II, F.M. 2, pages 180-181.

NOTE: A test for this topic is not indicated.

Topic Seven

THEME: To compute the probability of success and failure as ratios.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- express a probability as the ratio of the following two quantities
$$\frac{\text{number of ways to succeed}}{\text{number of possible outcomes}}$$
- state the relationship between the number of outcomes, the number of successes and the number of failures.
- use the rule that the probability of success plus the probability of failure equals 1.

VOCABULARY ADAPTATIONS:

TERMS DELETED: equivalent fractional forms
REVIEW TERMS: probability

ADAPTATIONS FOR LESSON 7, F.M. 1, pp. 95, 182-186.

CHALLENGE PROBLEM: If a bag contains 7 black and 4 white marbles, what is the probability that a marble picked out of the bag (without first looking inside) will be black?

DEVELOPMENT:

A. Discuss the challenge problem. Explain that there are seven ways to successfully pick a black marble because you could pick any one of the 7 black marbles. There are four ways you could fail to pick a black marble because you could pick one of the four white marbles. Therefore the probability of picking a black marble is:

$$\frac{\text{number of black marbles}}{\text{number of black marbles + number of white marbles}}$$

$$\frac{7}{7+4} = \frac{7}{11}$$

B. Elicit the fact that the probability of a successful event can be represented as a ratio or comparison of two numbers.

C. Give formulas to demonstrate that a probability ratio is a fractional number.

$$\text{probability of success} = \frac{\text{number of ways to succeed}}{\text{number of ways to succeed + no. of ways to fail}}$$
(something will happen)

$$\text{Probability of failure} = \frac{\text{number of ways to fail}}{\text{number of ways to succeed + no. of ways to fail}}$$
(something wont't happen)

D. Refer back to challenge problem and apply the formula for probability of success to get the ratio $\frac{7}{11}$.

E. Do adapted Application 1.

F. Proceed to Development 2, F.M. 1, page 183. Do not emphasize symbolic notation, and continue through development 5. Omit development 6. This will be covered in Topic 8.

NOTE: Test on Topic 7 not necessary.

ADAPTED APPLICATIONS:

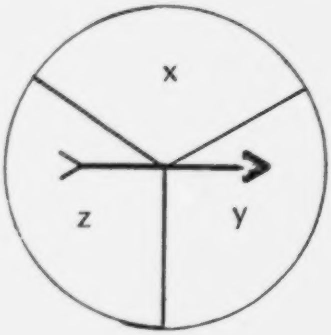
1. a. What is the probability of tossing a "head" on any one toss of a nickel?

   b. What is the probability of buying a winning ticket if there are 19 winning tickets and 300 losing tickets?

   c. What is the probability of rolling a five on the roll of die? On a pair of dice?

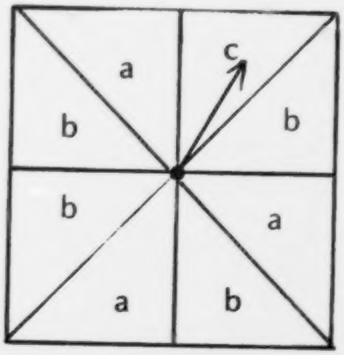
   d. From a bag containing 5 red chips and 2 blue chips, what is the probability of choosing a red chip?

   e. The spinner below has 3 equal areas, X, Y, and Z. What is the probability that the spinner will stop in the area Y on the next spin?



   f. What is the probability of picking a six from a deck of 52 cards?

   g. In which area is the spinner below most likely to stop?



   h. If there are 5 red marbles and 4 green marbles and 2 blue marbles, find the probability of picking a blue marble.

Topic Eight

THEME 1: To learn to identify prime and composite numbers.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- identify a prime number and define it.
- identify a composite number and define it.
- write a composite number as a product of two or more factors.

VOCABULARY ADAPTATIONS:

NEW TERMS: prime, composite, factor

ADAPTATIONS FOR LESSON 8, F.M. 1, pp. 187-190.

CHALLENGE PROBLEM: Vicky wanted to share 7 books among three of her friends. Jana said that if she wanted to give each of the girls the same amount of books, she had better share only 6 books between them. Was Jana correct in telling this to Vicky? Why?

DEVELOPMENT:

A. Discuss challenge problem. Elicit the fact from the students that 7 cannot be divided by anything except 7 and 1, whereas 6 can be divided evenly by 6, 3, 2 and 1. Therefore Jana was correct. Only 6 books can be divided between the girls evenly.

B. Inform the class that numbers can be classified for this reason as prime and composite.

C. Give definitions:

1. Prime number - is a number that can be divided only by 1 and itself and must be greater than 1.

2. Composite number - is a number which is not prime, in other words it is divisible by numbers other than itself and 1.

D. Refer back to challenge problem and elicit from the class how to classify 7 and 6.

7 - prime
6 - composite

E. Have students cite examples of prime numbers. See to it that students back up their answers by using the definition of prime number.

F. Develop a chart for classroom display and have students copy into notebooks a list from 1-100, circling prime numbers.

G. Do Application 1.

H. Have students express composite numbers as the product of two factors. Explain that some composite numbers may have more than one pair of factors.

	Number	Factors
For example:	18	3 x 6
		2 x 9
		1 x 18
	24	4 x 6
		8 x 3
		2 x 12
		1 x 24

I. Do Applications A and B, F.M. 1 pages 188-189.

SUMMARY:

1. A __________ is one of two or more numbers which yields a given product.

2. A number that has only 1 and itself as factors is a _________ number.

3. A number that is not prime is called a __________ number.

NOTE: A test is not indicated at the end of this topic. A test will be included at the end of Topic 8, Theme 2.

ADAPTED APPLICATIONS::

1. Which is a prime number?

   a. 6 c. 4
   b. 3 d. 8

2. What is the largest prime number that is less than 10?

3. Choose the prime number.

   a. 11 c. 18
   b. 12 d. 16

4. What is the smallest prime number?

5. Which is a prime number:

   a. 30 c. 45
   b. 14 d. 5

6. Which is not a prime number?

a. 7 c. 9
b. 13 d. 17

7. Choose the prime number.

a. 46 c. 200
b. 55 d. 101

8. Which is a prime number?

a. 40 c. 75
b. 23 d. 81

9. Which is a composite number?

a. 51 c. 41
b. 47 d. 53

Topic Eight

THEME 2: To learn how to reduce fractions to their lowest terms.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- identify equivalent fractions.
- identify the greatest common factor (G. C. F.) of a pair of numbers.
- reduce a fraction to its lowest terms by dividing the numerator and denominator by their G.C.F.

VOCABULARY ADAPTATIONS:

NEW TERMS: greatest common factor (G.C.F.), reduce, lowest terms, simplest form
REVIEW TERMS: equivalent fractions

ADAPTATIONS FOR LESSON 8, F.M. 1, pp 95, 187-190.

CHALLENGE PROBLEM: If $\frac{6}{18} = \frac{2}{6}$ and $\frac{2}{6} = \frac{1}{3}$, which answer do you think is in its simplest form?

DEVELOPMENT:

A. Review equivalent fractions. (Refer to Topic 3, Theme 2, F.M. 1 Adapted Guide, pp. 49-51.)

B. Do adapted application 1.

C. Refer to challenge problem. Elicit that in the fraction $\frac{1}{3}$ only 1 can divide the numerator and only 1 and 3 can divide the denominator, since 3 is prime.

D. Develop concept that a fraction is in its simplest or reduced form when the numerator and the denominator have no common factor other than 1. Refer back to $\frac{1}{3}$ as being in reduced form.

E. Develop concept of finding the greatest common factor (G.C.F.) for 2 or more numbers as follows:

   1. Find all the factors for the pair of numbers 18 and 24.

      The factors for 18 are 1, 2, 3, 6, 9 and 18.
      The factors for 24 are 1, 2, 3, 4, 6, 8, 12 and 24.

   2. Since the largest number that goes into both 18 and 24 is 6, the greatest common factor of 18 and 24 is 6. Abbreviation for greatest common factor is G.C.F. Note this point to students.

F. Do application C, F.M. 1, page 1 and adapted application 2.

G. Ask students if they can now devise a method to reduce a fraction to its simplest form. Set up a model problem as follows:

Reduce the fraction $\frac{12}{24}$ to its simplest form or lowest terms.
(Students should be familiar with both terms as they are synonomous.)

Solution: 1. Find the greatest common factor of 12 and 24 by listing all the factors of the two numbers.
e.g., 12 - 1, 2, 3, 4, 6, 12
24 - 1, 2, 3, 4, 6, 12, 24

2. Note that the G.C.F. is 12.

3. Divide the numerator and the denominator by the G.C.F.

e.g., $\frac{12 \div 12}{24 \div 12} = \frac{1}{2}$

4. The result from the division is $\frac{1}{2}$ which is the simplest form for $\frac{12}{24}$.

H. Do application D, F.M. 1, page 189.

SUMMARY:

Do challenge problem on page 187, F.M. 1.

ADAPTED APPLICATIONS:

1. Replace the letter with the appropriate number so that the fractions are equivalent.

   a. $\frac{1}{2} = \frac{x}{8}$
   b. $\frac{5}{8} = \frac{a}{16}$
   c. $\frac{3}{15} = \frac{9}{y}$
   d. $\frac{3}{4} = \frac{12}{x}$
   e. $\frac{3}{x} = \frac{9}{30}$
   f. $\frac{2}{11} = \frac{y}{22}$
   g. $\frac{1}{8} = \frac{x}{16}$
   h. $\frac{3}{7} = \frac{y}{21}$

2. Find the greatest common factor for each of the following sets of numbers:

   a. 15 and 30
   b. 21 and 35
   c. 10, 15, 25
   d. 9, 15, 27
   e. 10, 50, 60
   f. 8, 16, 40

SUGGESTED TEST ITEMS FOR TOPICS 6-8

NAME: ______________________________

1. If 8 orange marbles are placed in a bag and then 5 blue marbles are placed in the same bag, what is the probability of picking an orange marble?

2. What is the probability of picking an ace of spades from a deck of 52 cards?

3. What is the probability of rolling a 4 on one roll of one die?

4. What is the largest prime number between 1-10?

5. Which of the following is not prime?

   a. 23 c. 51
   b. 31 d. 7

6. Reduce $\frac{15}{25}$ to lowest terms.

7. What is the greatest common factor (G.C.F.) of 8, 16, 4?

8. Replace the X with the correct number.

   a. $\frac{1}{3} = \frac{x}{9}$ b. $\frac{3}{4} = \frac{6}{x}$

9. Which of the following is not a composite number?

   a. 27 c. 9
   b. 15 d. 23

10. What are the prime factors of 21?

Topic Nine

THEME: To learn the concept of a sample space.

NOTE: No adaptations or additional applications are necessary for the teaching of this topic. Follow F.M. 1, pages 191-193. Do not place too much emphasis on this theme if students have difficulty comprehending. (Topic not on R.C.T. exam.)

Topic Ten

THEME 1: To learn how to change a decimal to a percent.

ADAPTED PERFORMANCE OBJECTIVES: The students will be able to:

- change a fraction to a decimal.
- change a decimal to a percent.
- compute verbal problems with changing a fraction to a decimal and a decimal to a percent.

VOCABULARY ADAPTATIONS:

REVIEW TERM: percent

ADAPTATIONS FOR LESSON 10, F.M. 1, pp. 194-195.

CHALLENGE PROBLEM: If Eddy ate $\frac{3}{4}$ of a pizza, what percentage of the pie did he eat?

DEVELOPMENT:

A. Discuss challenge problem.

B. Review changing a fraction to a decimal.

e.g., To change $\frac{3}{4}$ to a decimal divide the denominator into the numerator.

Thus, $4\overline{)3.00}$ = .75

C. Do adapted application 1.

D. Recall that $.75 = \frac{75}{100}$

E. Do adapted application 2.

F. Develop concept that the decimal .75 means 75 out of 100. Therefore we can express a 2-place decimal as a percent

G. .75 = 75%

H. Develop rule for changing decimals to percents.

- to change a decimal to a percent, move the decimal point 2 places to the right and attach a percent sign (sign for percent is %).

I. Do adapted applications 3 and 4.

SUMMARY:

Review steps for changing a fraction to a percent.

ADAPTED APPLICATIONS:

1. Change the following fractions to decimals:

   a. $\frac{3}{5}$ d. $\frac{1}{2}$

   b. $\frac{1}{4}$ e. $\frac{7}{8}$

   c. $\frac{9}{10}$ f. $\frac{1}{3}$

   g. $\frac{3}{20}$

2. Change the following decimals to fractions:

   a. .65 d. .41

   b. .9 e. .87

   c. .81 f. .23

3. Change the following decimals to percents:

   a. .12 d. .03

   b. .92 e. 35.6

   c. .18 f. .56

   g. .9

4. Solve the following problems:

   a. Tom got $\frac{1}{2}$ of his homework correct. What percent of his homework was correct?

   b. Mary got 15 out of 20 questions correct on a test. What percent grade did she get?

   c. Darren picked 8 apples. Two of the apples were ripe. What percent of the apples were ripe?

   d. Marie passed 4 out of 5 tests. What percent of her tests did she pass?

   e. John received $\frac{9}{10}$ of his order from the store. What percent of his order did he receive?

Topic Ten

THEME 2: To learn how to use sample spaces to predict the outcomes of certain experiments.

NOTE: As in previous Topic 9, no adaptations or additional applications are necessary for the teaching of Topic 10, F.M. 1, pages 194-195. Follow the development and applications in the F.M. 1 guide, pages 194-195. Again, do not place too much emphasis on the concept of sample space, but use this as an opportunity to concretize the concepts of changing decimals to percents and percents to decimals.

Topic Eleven

THEME: To learn how to determine the expected number of outcomes using the probability ratio.

ADAPTATIONS FOR LESSON 11, pp. 196-197.

CHALLENGE PROBLEM: Use application 2, F.M. 1, page 197.

DEVELOPMENT:

A. Discuss challenge problem.

B. Develop plan for solution:

   1. Find P (success) for each question or trial.

   2. P (success) = $\frac{1}{4}$ since one out of four choices is correct.

   3. Find the number of questions: 20.

   4. Find the expected number of correct answers using the formula:

Expected number of successful outcomes = P (s) x number of questions

$$\frac{1}{4} \times 20$$

$$= \frac{1}{4} \times \frac{20}{1}$$

NOTE: Review multiplication of fraction and whole number.

$$= \frac{20}{4}$$

$$= 5 \text{ correct answers}$$

C. Do application 1, F.M. 1, page 197.

D. Elicit to class that $\frac{1}{4}$ x 20 can also be expressed as $\frac{1}{4}$ of 20. The word of is clue to multiply fraction and whole number.

E. Do adapted application 1.

F. Do challenge problem in F.M. 1, page 196

G. Do development 2 and 3, F.M. 1, pages 196-197.

H. Do adapted application 2.

ADAPTED APPLICATIONS:

1. Compute the examples below:

   a. $\frac{2}{5}$ of 50

   b. $\frac{5}{8}$ of 32

   c. $\frac{1}{2}$ of 100

   d. $\frac{1}{4}$ of 72

   e. $\frac{2}{3}$ of 21

   f. $\frac{1}{8}$ of 40

   g. $\frac{3}{11}$ of 88

   h. $\frac{5}{10}$ of 40

2. Solve the problems below:

   a. Marcus ate $\frac{5}{8}$ of an 8 slice pizza. How many slices of the pie did he eat?

   b. There were 40 students in the class. On Monday $\frac{1}{4}$ of them were absent. How many students were absent?

   c. Dahlia got $\frac{1}{5}$ of her questions wrong on a test. There were 50 questions on the test. How many questions did she get wrong?

   d. What is $\frac{3}{4}$ of $100?

SUGGESTED TEST ITEMS FOR TOPICS 9-11

Name: ______________________________

1. Change the following fractions to a decimal and a percent:

Fraction	Decimal	Percent
a. $\frac{2}{5}$		
b. $\frac{3}{4}$		

2. What is $\frac{7}{10}$ of $100?

3. Change .45 to a fraction.

4. Multiply $\frac{5}{9}$ x 90.

5. Shana passed 3 out of 5 tests. What percent of her tests did she pass?

6. There were 35 students in a class. The teacher gave them a test and $\frac{5}{7}$ of the class passed. How many passed?

7. Jerry delivered $\frac{1}{2}$ of his newspapers. What percent of his newspapers did he deliver?

8. Change .03 to a percent.

9. Change .9 to a fraction.

10. What is $\frac{3}{4}$ of 124?

Evaluation Form

This is an experimental bulletin in mathematics. It needs your suggestions and support before it can be revised for maximum implementation.

1. How many classes in your school pursued this course of study? ____________

2. What was the grade level of most of the students who were programmed for this course? ____________

3. How helpful do you think this course of study will be in helping the students pass the Regents Competency Examination in mathematics?

4. Which unit or lesson stands out as having been most successful in your classrooms?

5. What specific suggestions do you have for the improvement of this bulletin? (Wherever possible, refer to specific pages.)

6. What additional comments would you like to make?

Please return by June 1985 to:

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